

Figure 80. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 17, 2023, showing high AOD values in Northwestern Ohio, including Lucas County.

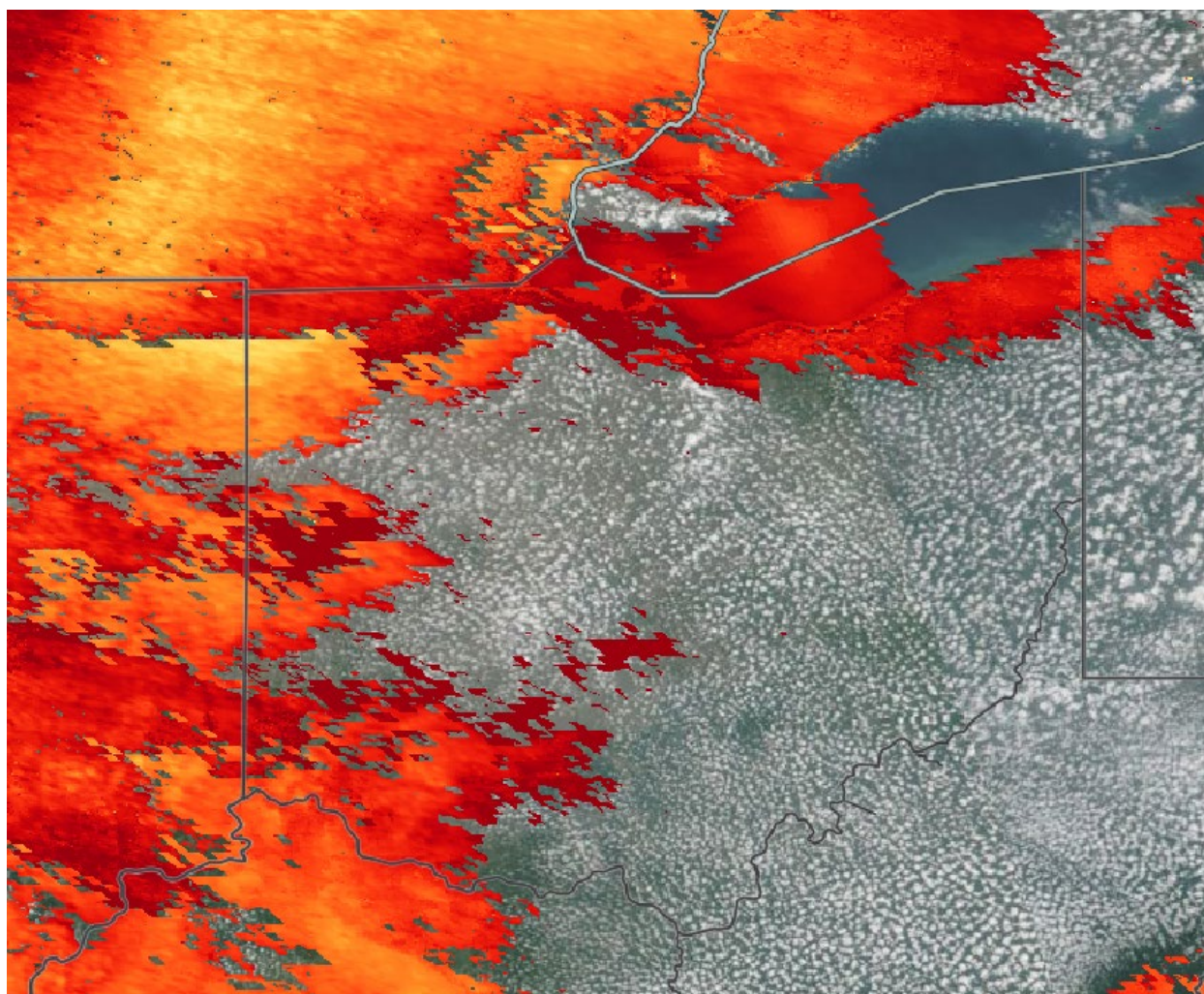


Figure 81 shows the near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 17, 2023. The HRRR model initialization showed near-surface smoke across all of Ohio, including near-surface smoke concentrations of approximately $6 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 17, 2023.

Figure 81. Map of near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 17, 2023.

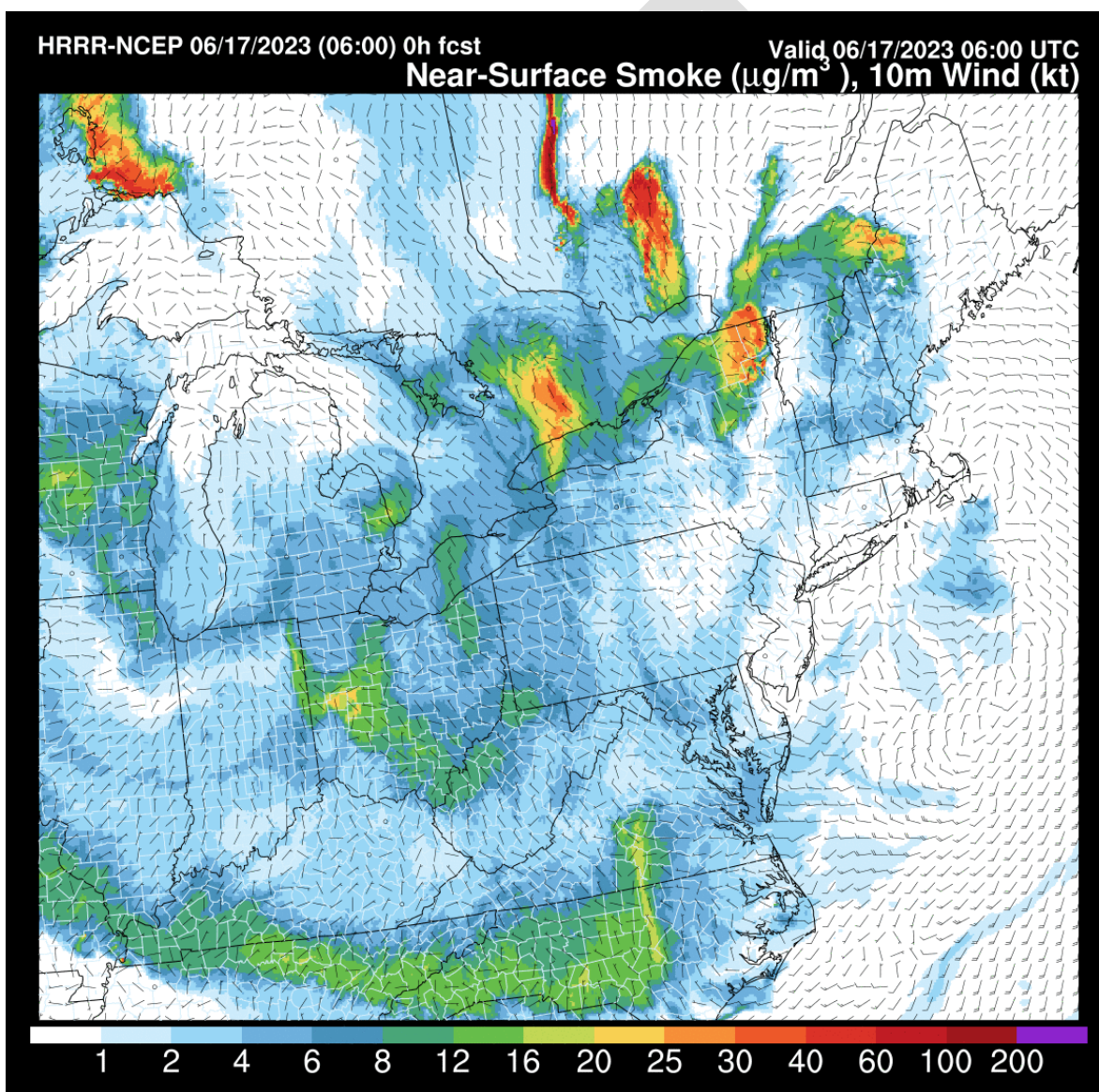
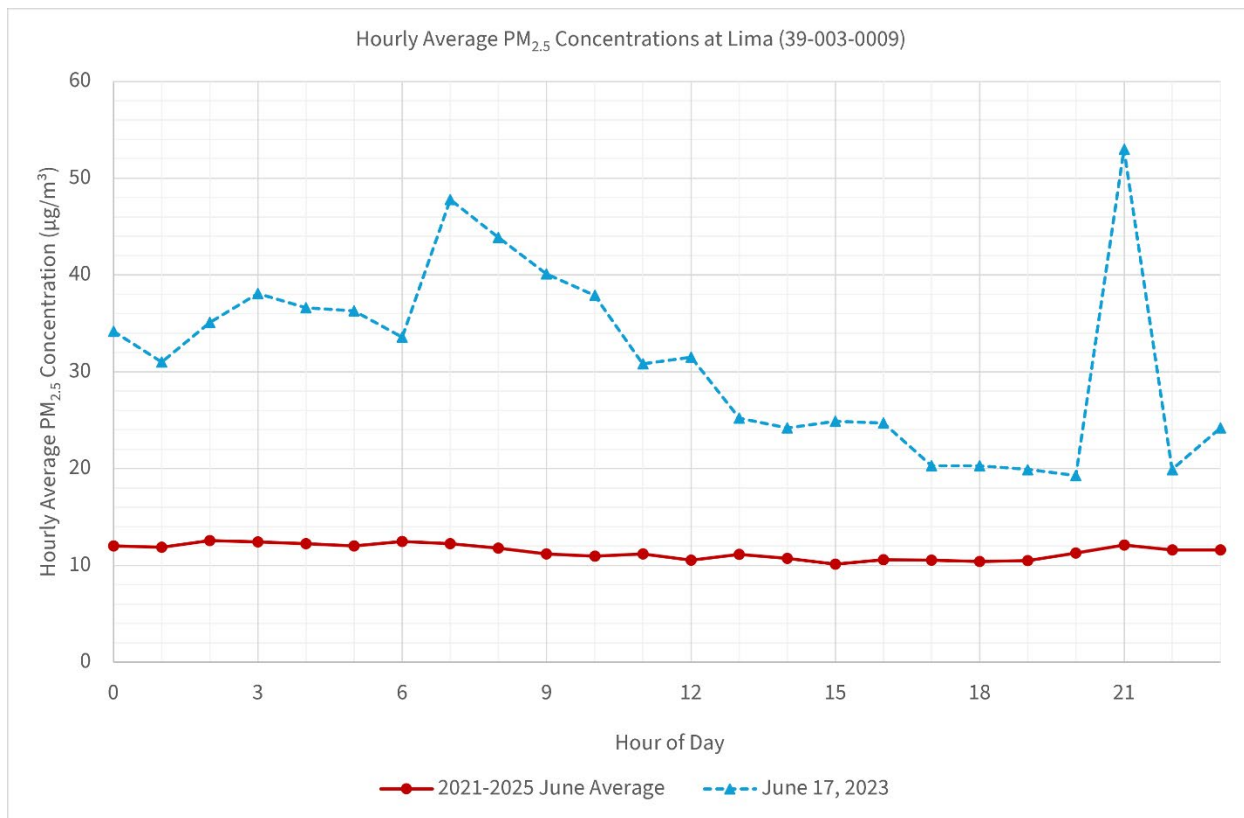


Table 7 and Figure 82 show the hourly average PM_{2.5} concentrations on June 17, 2023, and the 2021-2025 average June concentrations measured at the Lima (39-003-0009) monitoring site in Allen County, Ohio. The Lima monitoring site is located 112 km south-southwest of the Eastside Pump St monitoring site, which did not have a continuous PM_{2.5} monitor operating on June 17, 2023. The hourly average PM_{2.5} concentrations at the Lima monitoring site on June 17 were already elevated from wildfire smoke that had rolled in overnight and remained elevated throughout the rest of June 17 as wildfire smoke continually descended on the surface across Northwestern Ohio, providing further evidence that wildfire smoke impacted PM_{2.5} concentrations in Northwestern Ohio, including Lucas County, on June 17, 2023.

Table 7. Hourly average PM_{2.5} concentration data from the Lima (39-003-0009) monitoring site in Allen County, Ohio on June 17, 2023, and 2021-2025 average June concentration data.

Hour of Day	2021-2025 Average June Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on June 17, 2023
00:00	12.0	34.2
01:00	11.9	31.0
02:00	12.6	35.1
03:00	12.4	38.1
04:00	12.2	36.6
05:00	12.0	36.3
06:00	12.5	33.6
07:00	12.2	47.8
08:00	11.8	43.9
09:00	11.2	40.1
10:00	11.0	37.9
11:00	11.2	30.8
12:00	10.5	31.5
13:00	11.2	25.2
14:00	10.7	24.2
15:00	10.2	24.9
16:00	10.6	24.7
17:00	10.6	20.3
18:00	10.4	20.3
19:00	10.5	19.9
20:00	11.3	19.3
21:00	12.1	53.0
22:00	11.6	19.9
23:00	11.6	24.2

Figure 82. Plot of hourly average PM_{2.5} concentrations from the Lima (39-003-0009) monitoring site in Allen County, Ohio on June 17, 2023, and 2021-2025 average June concentrations.



3.3. Wildfire Smoke-Driven PM_{2.5} Episode from June 3-8, 2025

3.3.1. June 3, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on June 3, 2025. Figure 83 shows the HYSPLIT 72-hour back trajectory plot for June 3, overlaid on a map of fire locations, monitored hourly average surface PM_{2.5} concentrations at 14:00 EST, and HMS smoke polygons for May 31. Figure 84 shows the HYSPLIT 72-hour forward trajectory plot for May 31, overlaid on a map of fire locations, monitored hourly average surface PM_{2.5} concentrations at 14:00, and HMS smoke polygons for June 3. The wildfires burning 175 km (108.7 mi) north of Red Lake, Ontario coincide with the point (at 3459 meters AGL) at 14:00 EST on May 31 of the 1000-meter release height back trajectory from Toledo and the 3500-meter release height forward trajectory from those wildfires at 14:00 EST on May 31 reaches Toledo (at 1192 meters AGL) at 14:00 EST on June 3. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning in western Ontario caused the high PM_{2.5} concentrations in Lucas County on June 3, 2025. The accompanying imagery map for June 3 presented in Figure 85 shows visible wildfire smoke over much of Ohio, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on June 3, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 83. HYSPLIT 72-hour back trajectory plot from June 3, 2025, with fire locations, monitored hourly average surface PM_{2.5} concentrations at 14:00 EST, and HMS smoke polygons for May 31, 2025.

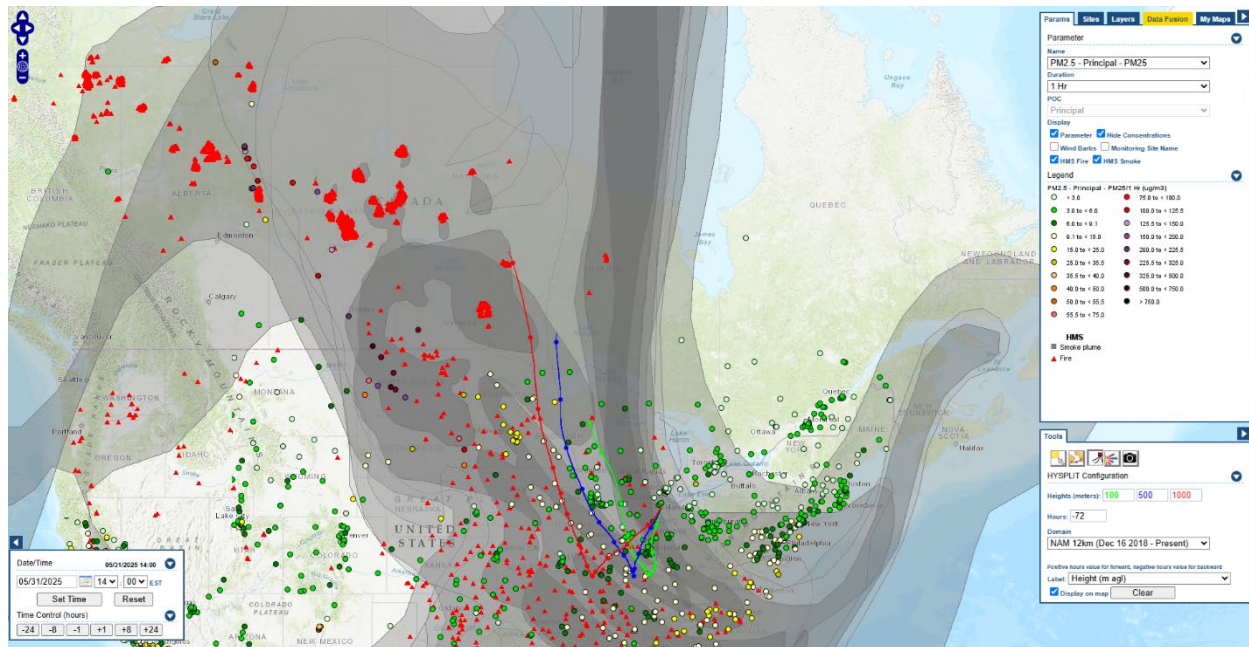


Figure 84. HYSPLIT 72-hour forward trajectory plot from May 31, 2025, with fire locations, monitored hourly average surface PM_{2.5} concentrations at 14:00 EST, and HMS smoke polygons for June 3, 2025.

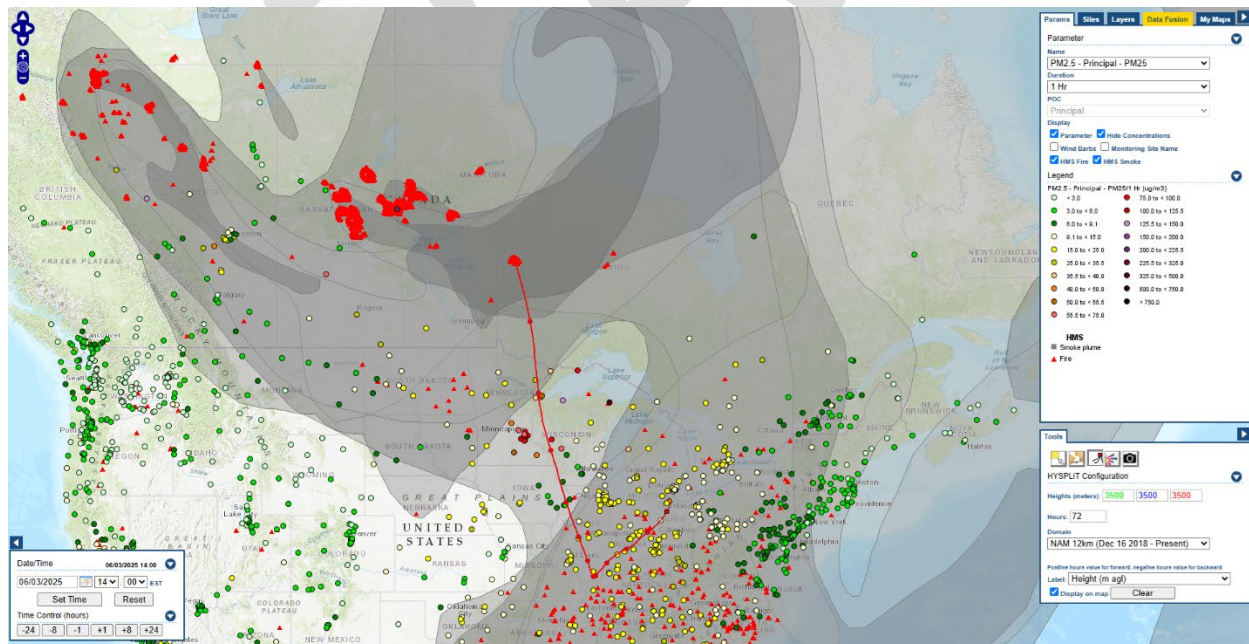


Figure 85. Terra satellite true color imagery of Ohio for June 3, 2025, showing visible wildfire smoke across much of Ohio, including Lucas County.



Table 8 and Figure 86 show the hourly average $PM_{2.5}$ concentrations on June 3, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations steadily increased throughout the morning of June 3 as wildfire smoke rolled in and remained elevated the rest of the day, peaking at $43.1 \mu\text{g}/\text{m}^3$ at 14:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on June 3, 2025.

Table 8. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 3, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 3, 2025
00:00	12.9	10.4
01:00	12.6	10.1
02:00	12.3	11.7
03:00	12.2	14.1
04:00	12.4	17.0
05:00	13.2	19.8
06:00	14.2	26.0
07:00	14.1	21.9
08:00	14.2	24.6
09:00	14.5	21.0
10:00	14.6	18.2
11:00	14.5	22.3
12:00	15.5	27.2
13:00	14.1	35.1
14:00	13.7	43.1
15:00	12.8	38.0
16:00	12.8	30.0
17:00	12.4	28.0
18:00	12.1	26.0
19:00	11.6	24.6
20:00	11.9	25.5
21:00	12.4	27.5
22:00	13.0	27.7
23:00	13.3	28.4

Figure 86. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 3, 2025, and 2024-2025 average June concentrations.

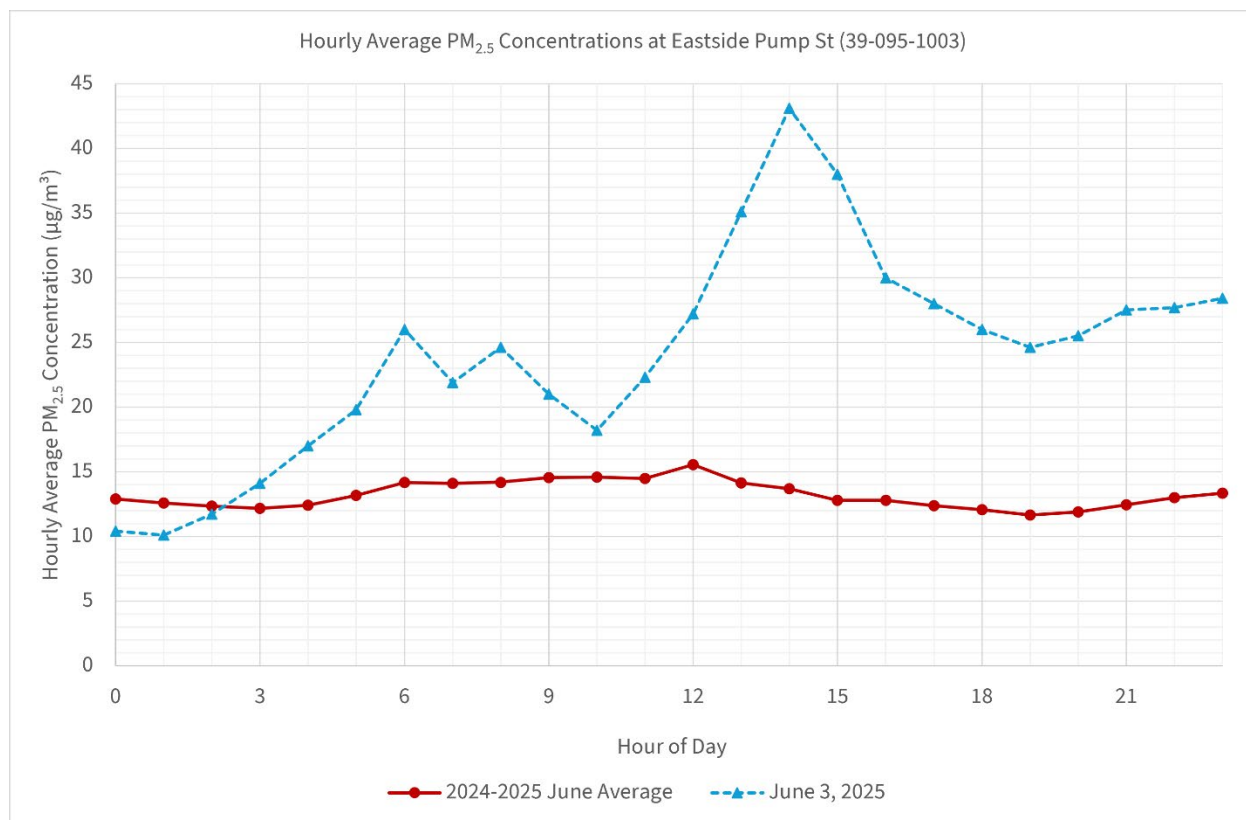
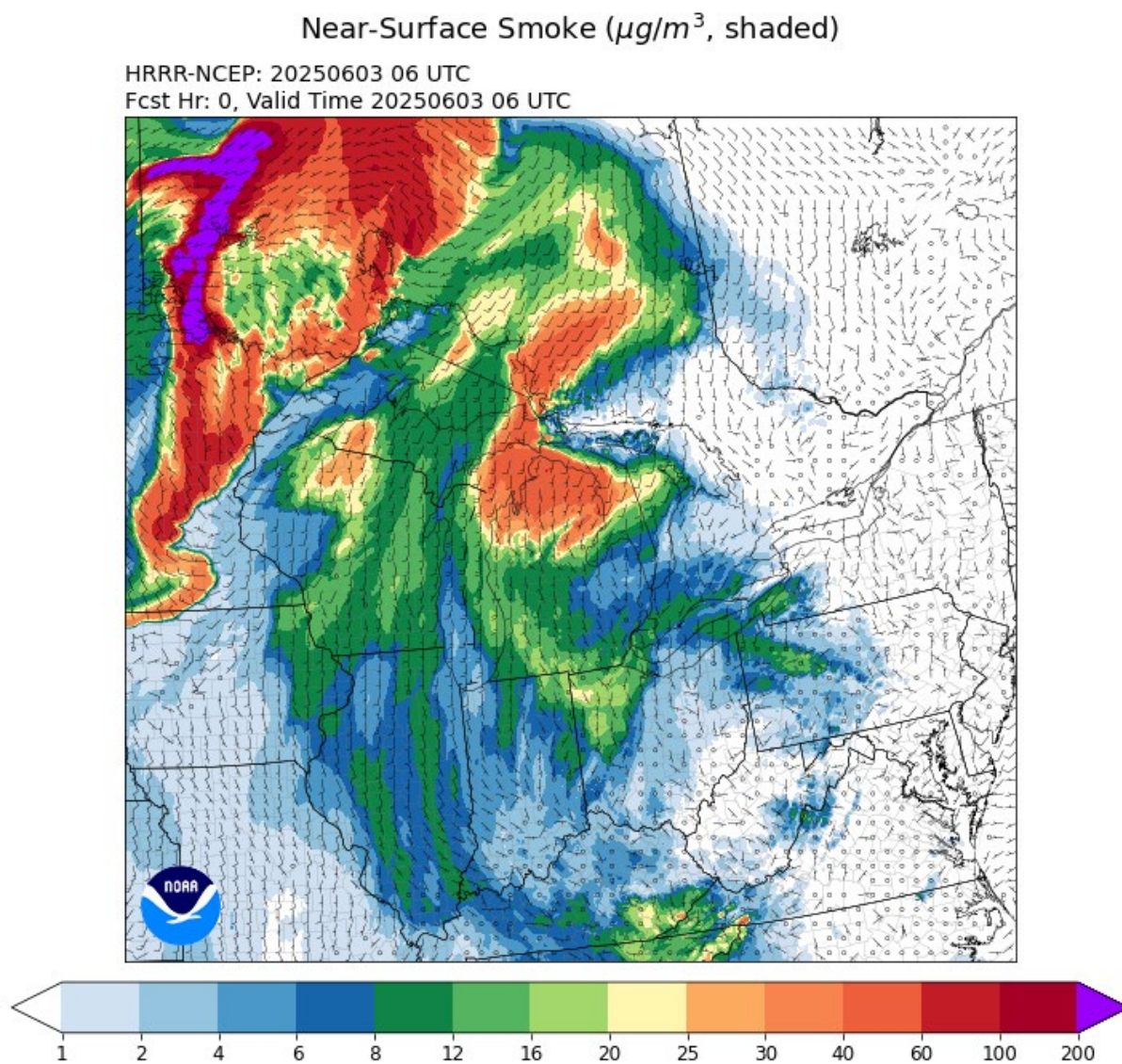


Figure 87 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 3, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $16 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 3, 2025.

Figure 87. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 3, 2025.



3.3.2. June 4, 2025

The HYSPLIT 96-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on June 4, 2025. Figure 88 shows the HYSPLIT 96-hour back trajectory plot for June 4, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for May 31. Figure 89 shows the HYSPLIT 96-hour forward trajectory plot for May 31, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 4. The 150-meter release height 96-hour back trajectory from Toledo, composed of a 24-hour back trajectory from the endpoint of the 72-hour back trajectory from the Eastside Pump St monitoring site in Toledo, shows the air parcel released at 00:00 EST on June 4 was located (at a height of 2685.9 m AGL) at the wildfires burning near Webequie, Ontario at 01:00 EST on May 31. The 2700-meter release height 96-hour forward trajectory from the wildfires burning near Webequie, Ontario at 01:00 EST on May 31, composed of a 24-hour forward trajectory from the endpoint of the 72-hour forward trajectory from the wildfires, reaches the Toledo area (at a height of 112.0 m AGL) at 00:00 EST on June 1. The coincidence of the 96-hour back and forward trajectories between the wildfires and Toledo serves as clear evidence that the smoke from the wildfires burning near Webequie, Ontario caused the high PM_{2.5} concentrations in Lucas County on June 4, 2025. The accompanying imagery map for June 4 presented in Figure 90 shows moderate and high AOD values between cloud cover over much of Ohio, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on June 4, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 88. HYSPLIT 96-hour back trajectory plot from June 4, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for May 31, 2025.

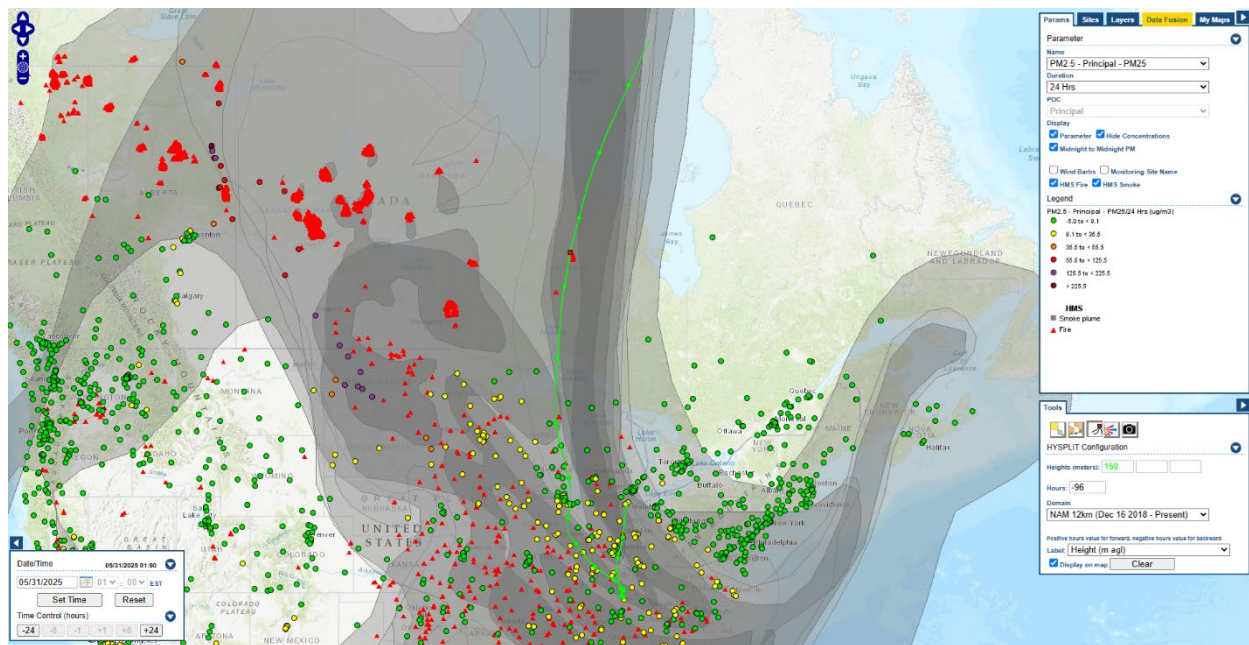


Figure 89. HYSPLIT 96-hour forward trajectory plot from May 31, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 4, 2025.

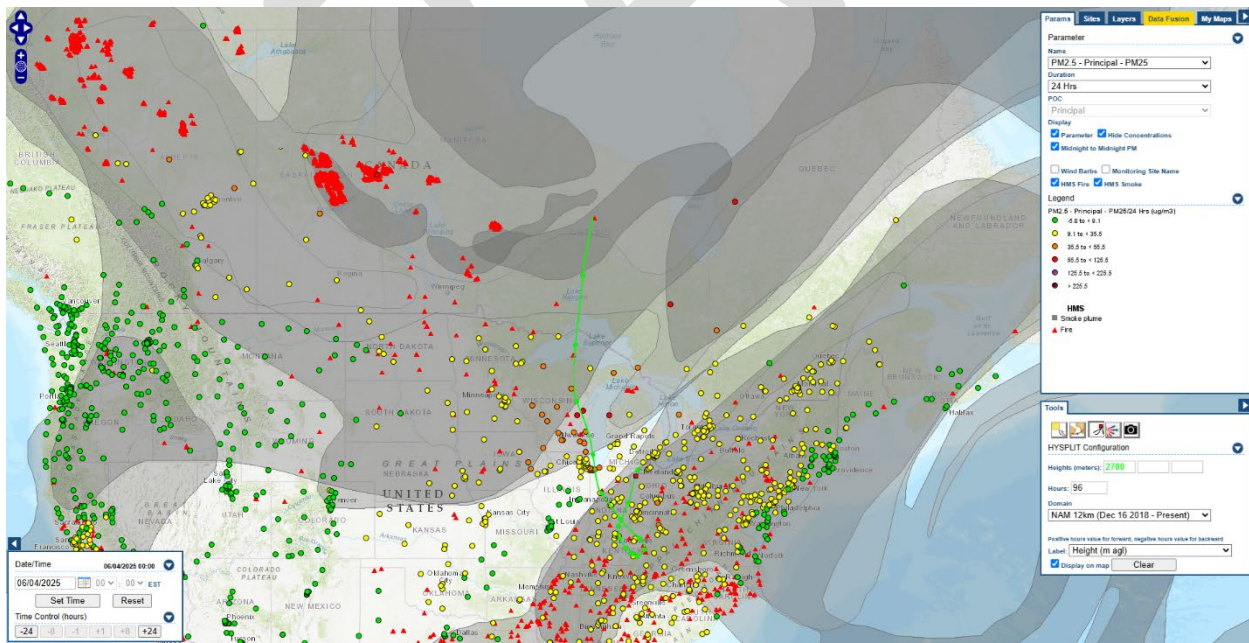


Figure 90. Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 4, 2025, showing moderate and high AOD values between cloud cover across much of Ohio, including Lucas County.

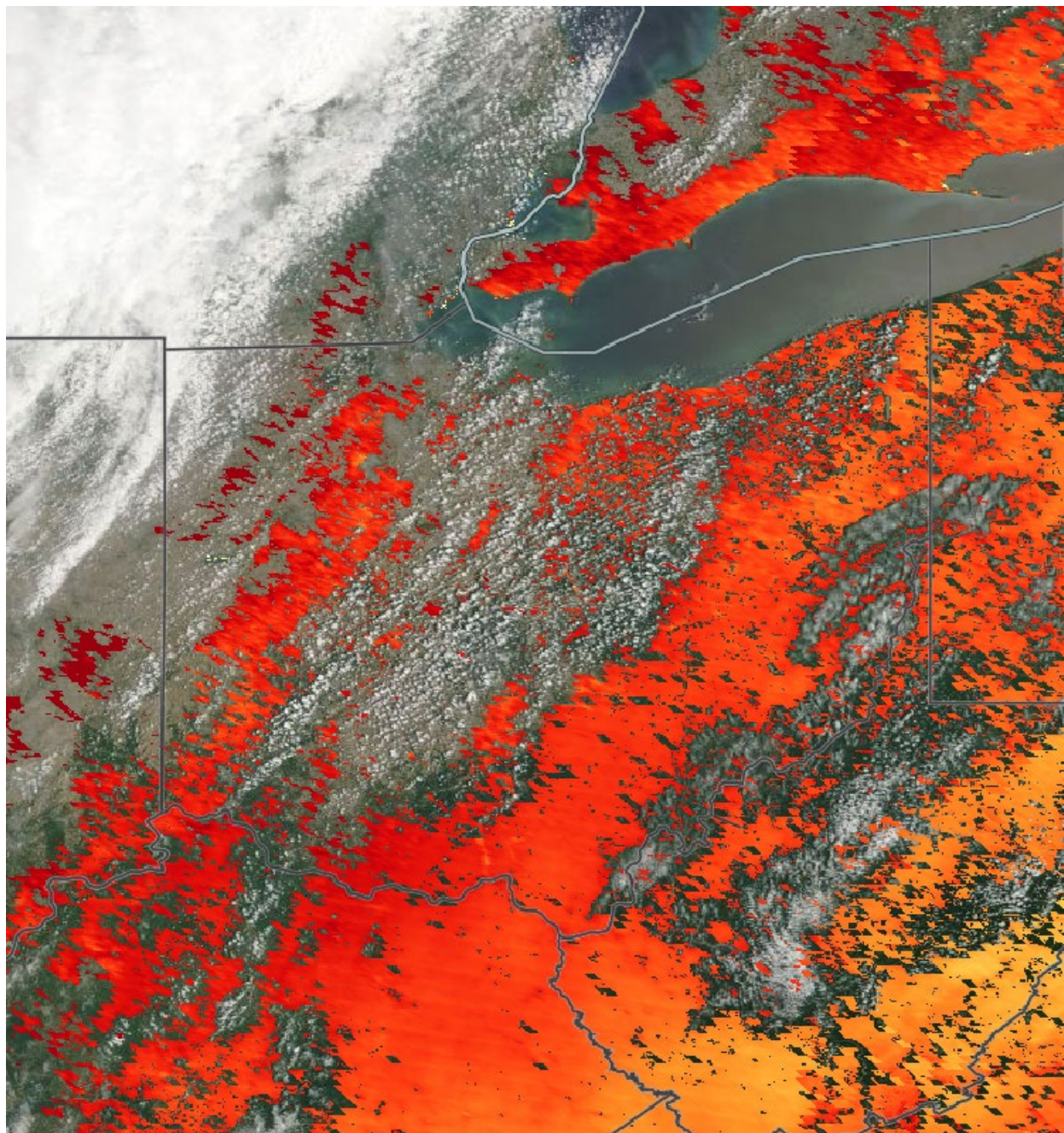


Table 9 and Figure 91 show the hourly average PM_{2.5} concentrations on June 4, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average PM_{2.5} concentrations remained elevated from the wildfire smoke that had descended on the surface until a front carrying precipitation moved into Northwestern Ohio the evening of June 4, providing further evidence that wildfire smoke impacted PM_{2.5} concentrations in Lucas County on June 4, 2025.

Table 9. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 4, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 4, 2025
00:00	12.9	31.0
01:00	12.6	28.2
02:00	12.3	26.7
03:00	12.2	27.1
04:00	12.4	26.2
05:00	13.2	26.0
06:00	14.2	29.0
07:00	14.1	38.0
08:00	14.2	41.5
09:00	14.5	35.4
10:00	14.6	40.8
11:00	14.5	43.5
12:00	15.5	52.2
13:00	14.1	40.5
14:00	13.7	26.7
15:00	12.8	18.3
16:00	12.8	17.9
17:00	12.4	12.7
18:00	12.1	9.1
19:00	11.6	7.6
20:00	11.9	6.7
21:00	12.4	9.1
22:00	13.0	13.0
23:00	13.3	18.3

Figure 91. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 4, 2025, and 2024-2025 average June concentrations.

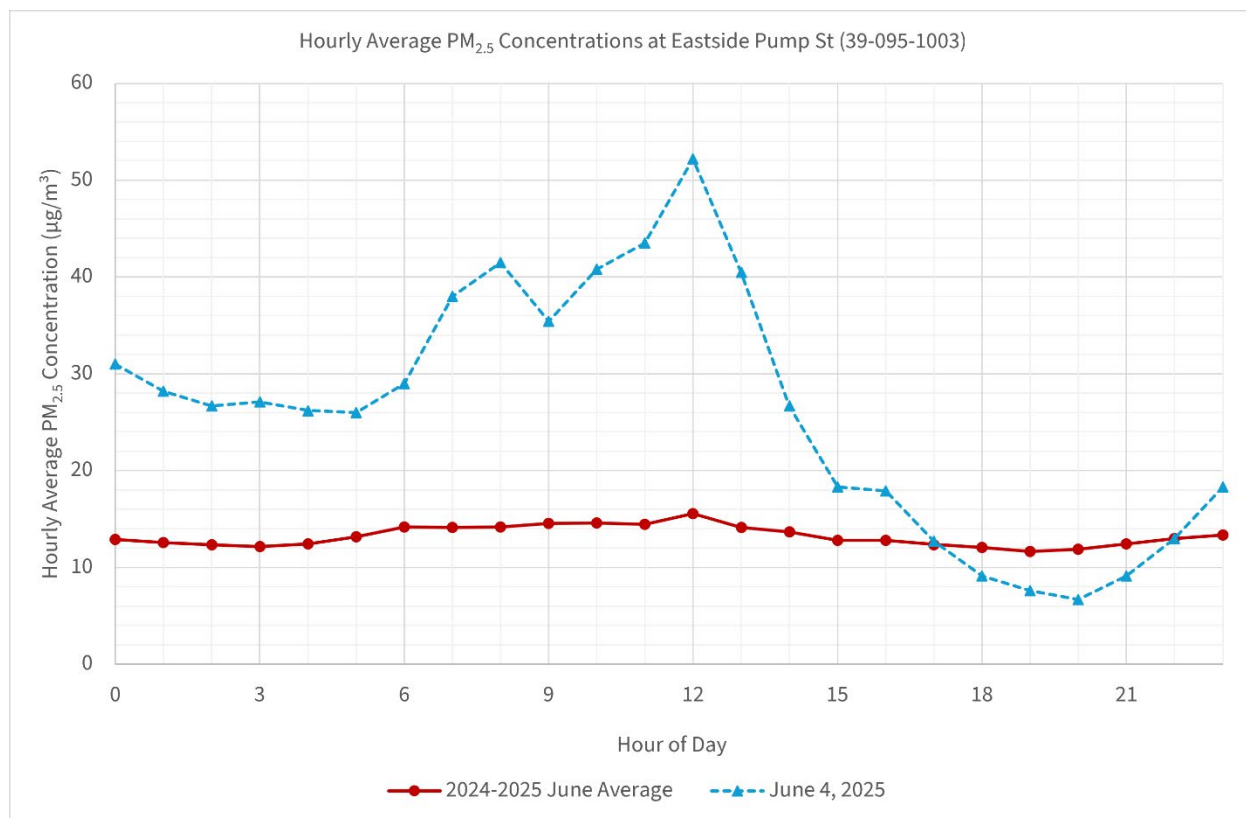
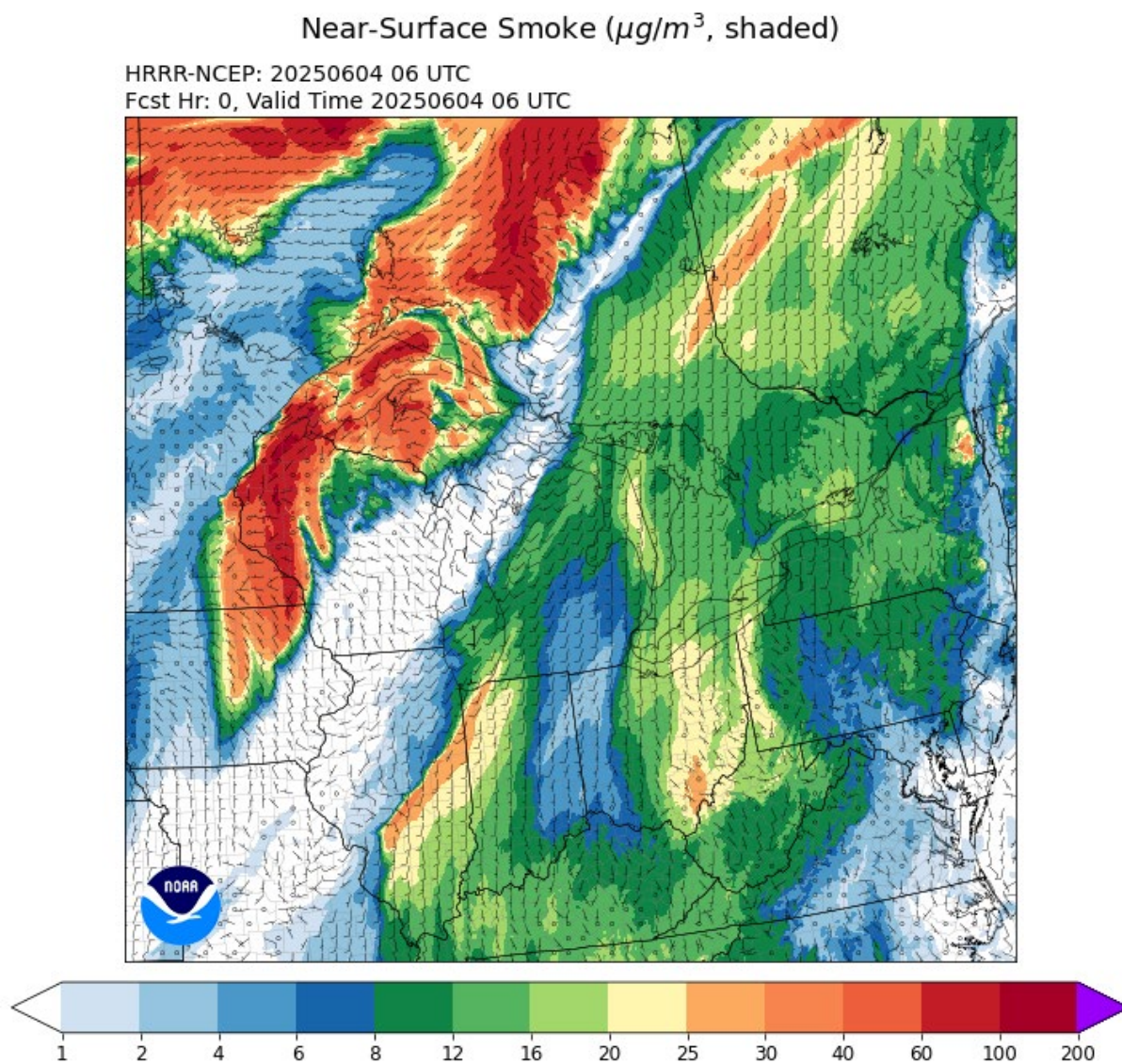


Figure 92 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 4, 2025. The HRRR model initialization showed near-surface smoke across all of Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 4, 2025.

Figure 92. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 4, 2025.



3.3.3. June 5, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface $PM_{2.5}$ concentrations in Lucas County on June 5, 2025. Figure 93 shows the HYSPLIT 72-hour back trajectory plot for June 5, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 5. Figure 94 shows the HYSPLIT 72-hour forward trajectory plot for June 2, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 5. The wildfires burning 16 km (9.9 mi) northwest of La Ronge, Saskatchewan coincide with the point (at 3009.3 meters AGL) at 07:00 EST on June 2 of the 100-meter release height back trajectory from Toledo and the 3000-meter release height forward trajectory from those wildfires at 07:00 EST on June 2 reaches Toledo (at 69.4 meters AGL) at 07:00 EST on June 5. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning northwest of La Ronge, Saskatchewan caused the high $PM_{2.5}$ concentrations in Lucas County on June 5, 2025. The accompanying imagery map for June 5 presented in Figure 95 shows moderate and high AOD values across the Great Lakes region, while the wildfire smoke over Ohio is largely not captured due to heavy cloud cover. The high AOD values observed in all directions for nearby areas not obscured by cloud cover provide further evidence that smoke from the Canadian wildfires was present in Lucas County on June 5, 2025, and that this wildfire smoke was the cause of the high concentrations of $PM_{2.5}$ at monitoring sites in Lucas County.

Figure 93. HYSPLIT 72-hour back trajectory plot from June 5, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 2, 2025.

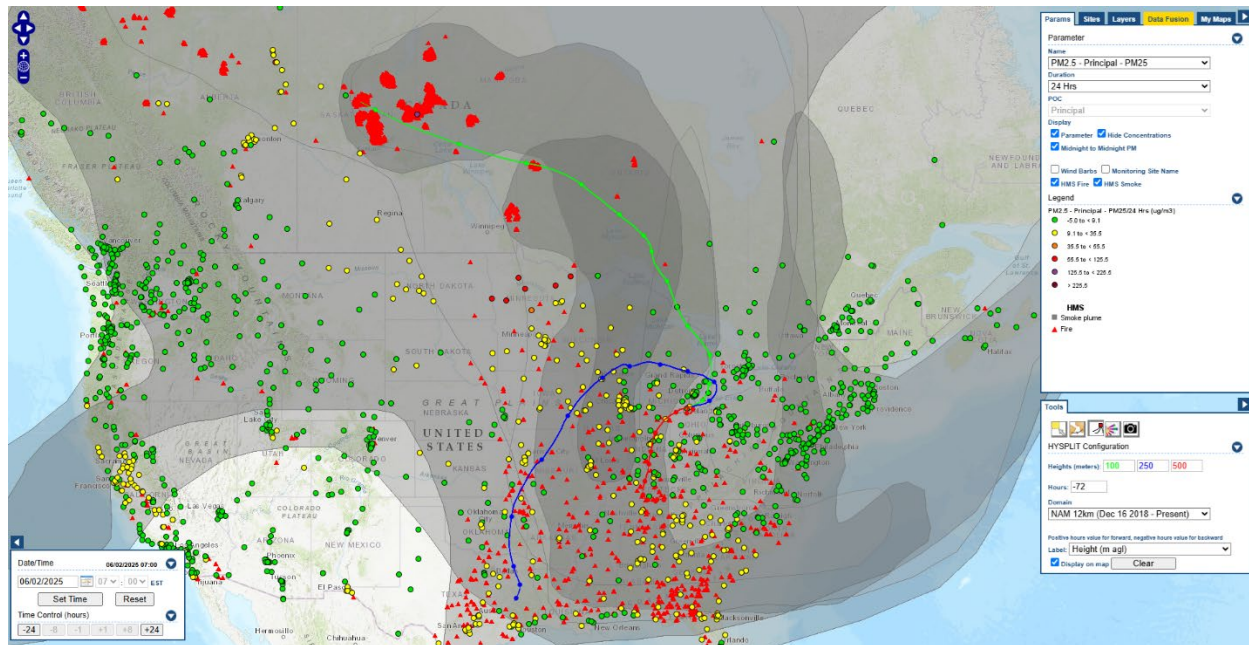


Figure 94. HYSPLIT 72-hour forward trajectory plot from June 2, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 5, 2025.

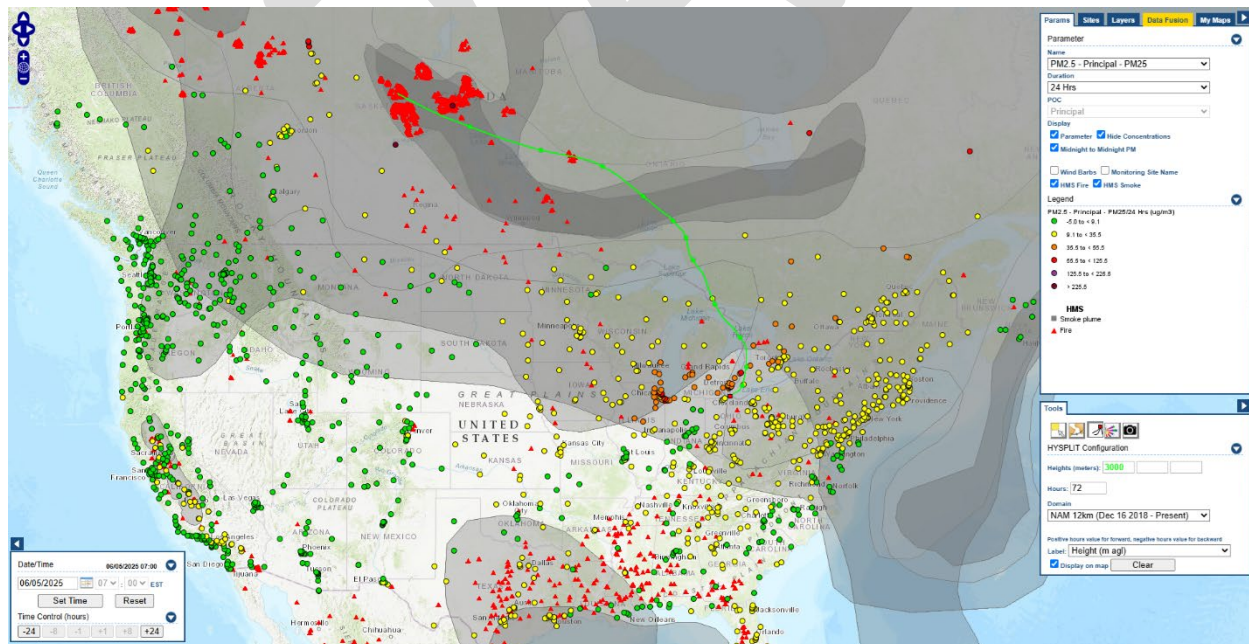


Figure 95. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 5, 2025, showing moderate and high AOD values in surrounding states, while the wildfire smoke over Ohio is largely not captured due to heavy cloud cover.

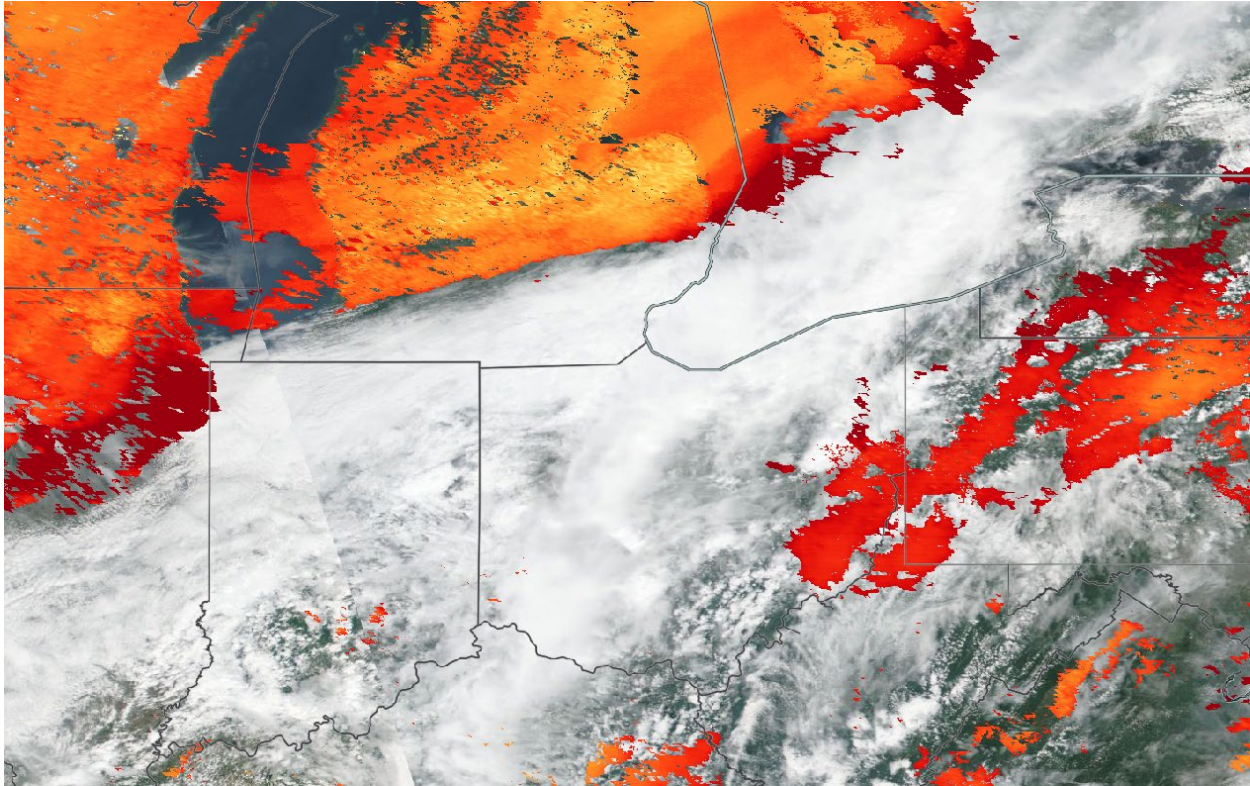


Table 10 and Figure 96 show the hourly average $PM_{2.5}$ concentrations on June 5, 2025, measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations sharply increased from 06:00 to 08:00 EST as wildfire smoke rolled in, remaining elevated the rest of the day and peaking at $62.7 \mu\text{g}/\text{m}^3$ at 17:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on June 5, 2025.

Table 10. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 5, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on June 5, 2025
00:00	12.9	16.9
01:00	12.6	18.8
02:00	12.3	12.2
03:00	12.2	5.4
04:00	12.4	6.1
05:00	13.2	5.6
06:00	14.2	5.0
07:00	14.1	17.7
08:00	14.2	34.2
09:00	14.5	35.3
10:00	14.6	33.5
11:00	14.5	34.8
12:00	15.5	32.1
13:00	14.1	26.6
14:00	13.7	22.5
15:00	12.8	35.8
16:00	12.8	58.2
17:00	12.4	62.7
18:00	12.1	59.8
19:00	11.6	46.1
20:00	11.9	44.4
21:00	12.4	37.9
22:00	13.0	37.2
23:00	13.3	39.5

Figure 96. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 5, 2025, and 2024-2025 average June concentrations.

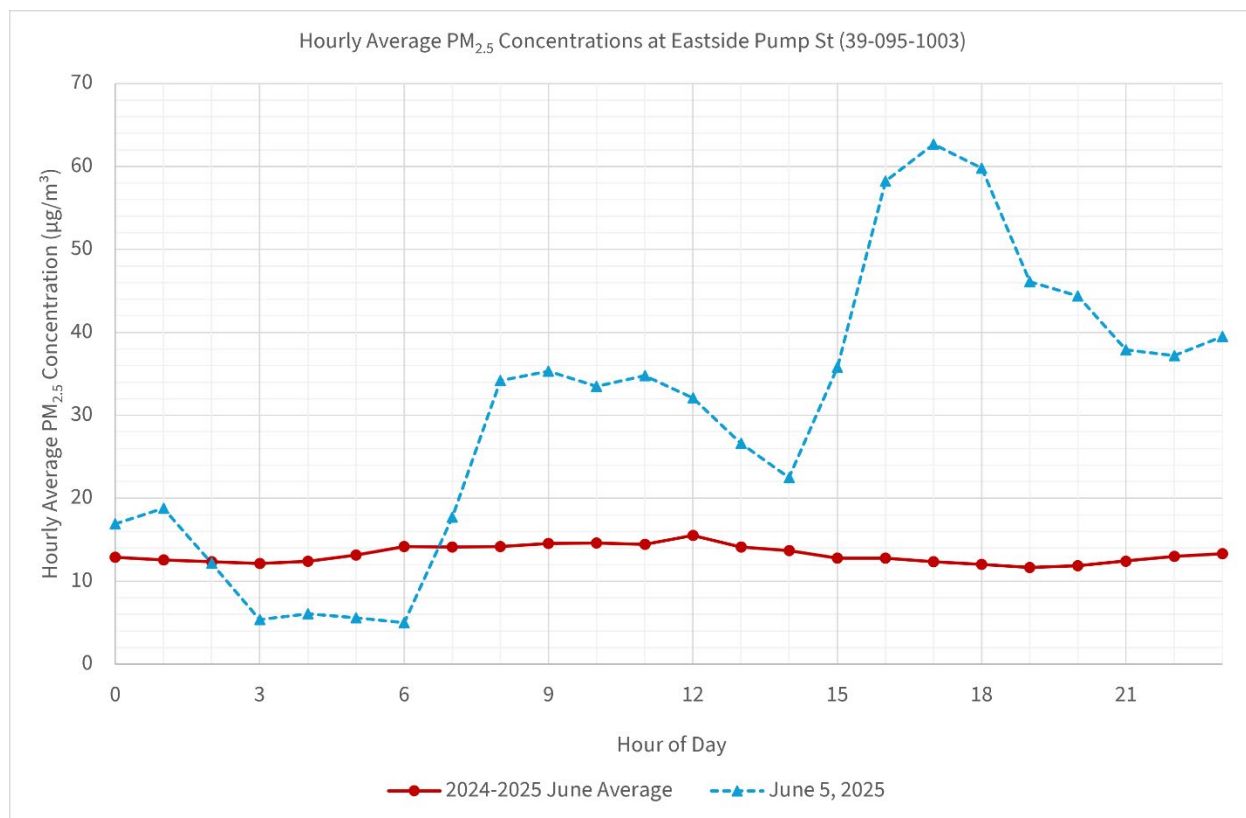
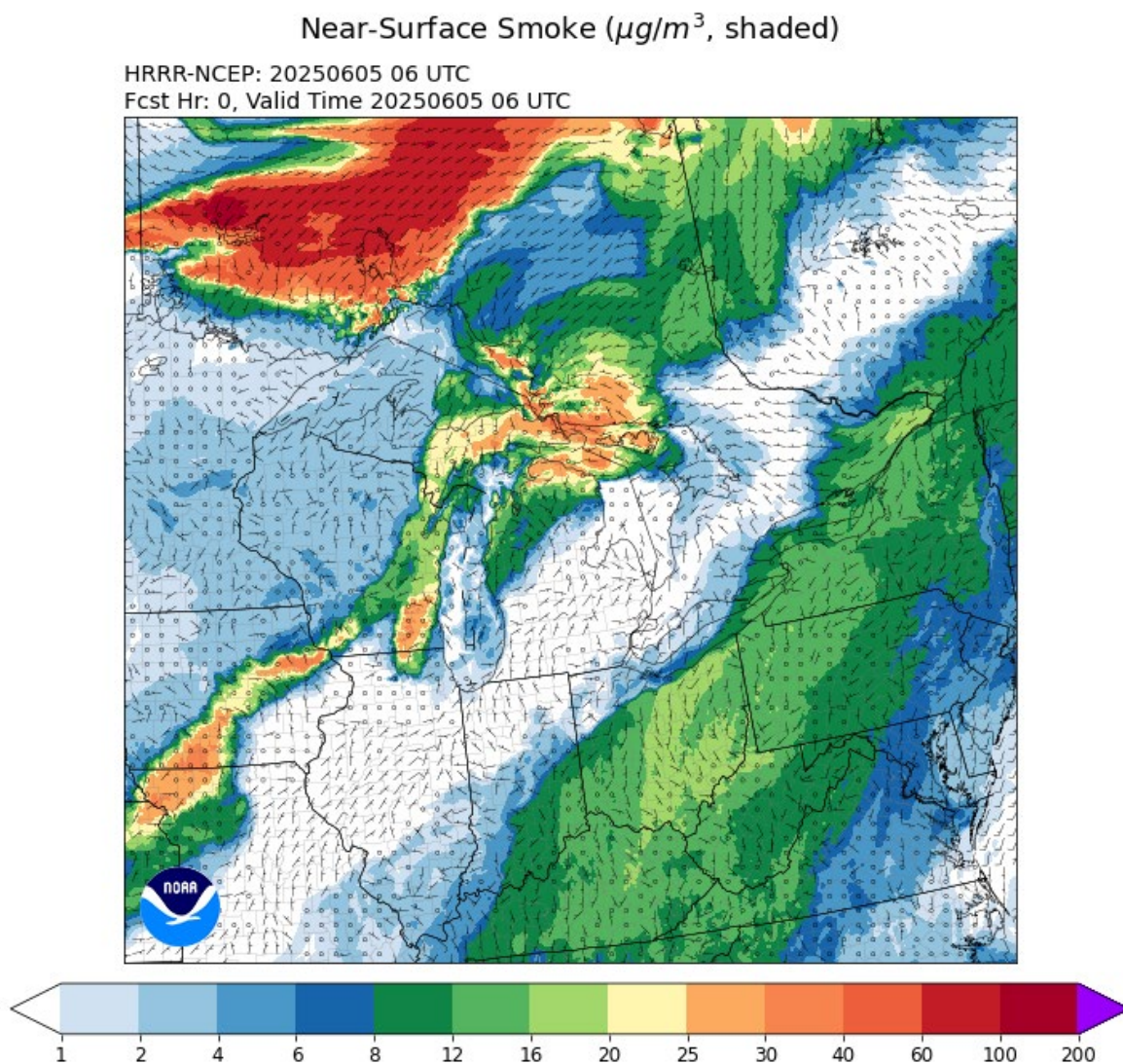


Figure 97 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 5, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately 4-6 $\mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 5, 2025.

Figure 97. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 5, 2025.



3.3.4. June 6, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface $PM_{2.5}$ concentrations in Lucas County on June 6, 2025. Figure 98 shows the HYSPLIT 72-hour back trajectory plot for June 6, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 3. Figure 99 shows the HYSPLIT 72-hour forward trajectory plot for June 3, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 6. A heavily wildfire smoke-impacted location near the wildfires burning 175 km (108.7 mi) north of Red Lake, Ontario coincides with the point (at 1544.6 meters AGL) at 00:00 EST on June 3 of the 100-meter release height back trajectory from Toledo and the 1550-meter release height forward trajectory from those wildfires at 00:00 EST on June 3 reaches Toledo (at 102.5 meters AGL) at 00:00 EST on June 6. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning north of Red Lake, Ontario caused the high $PM_{2.5}$ concentrations in Lucas County on June 6, 2025. The accompanying imagery map for June 6 presented in Figure 100 shows moderate and high AOD values across the Great Lakes region, while the wildfire smoke over Ohio is largely not captured due to heavy cloud cover. The high AOD values observed just to the north, stretching across Michigan in areas not obscured by cloud cover, provide further evidence that smoke from the Canadian wildfires was present in Lucas County on June 6, 2025, and that this wildfire smoke was the cause of the high concentrations of $PM_{2.5}$ at monitoring sites in Lucas County.

Figure 98. HYSPLIT 72-hour back trajectory plot from June 6, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 3, 2025.

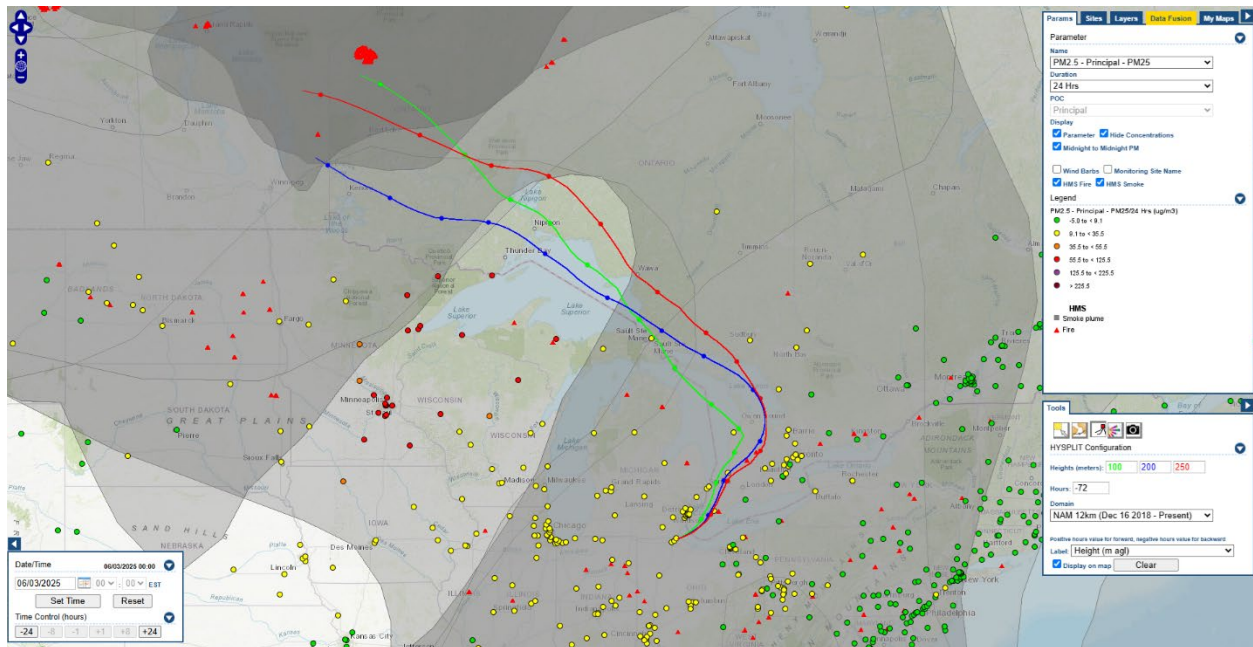


Figure 99. HYSPLIT 72-hour forward trajectory plot from June 3, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 6, 2025.

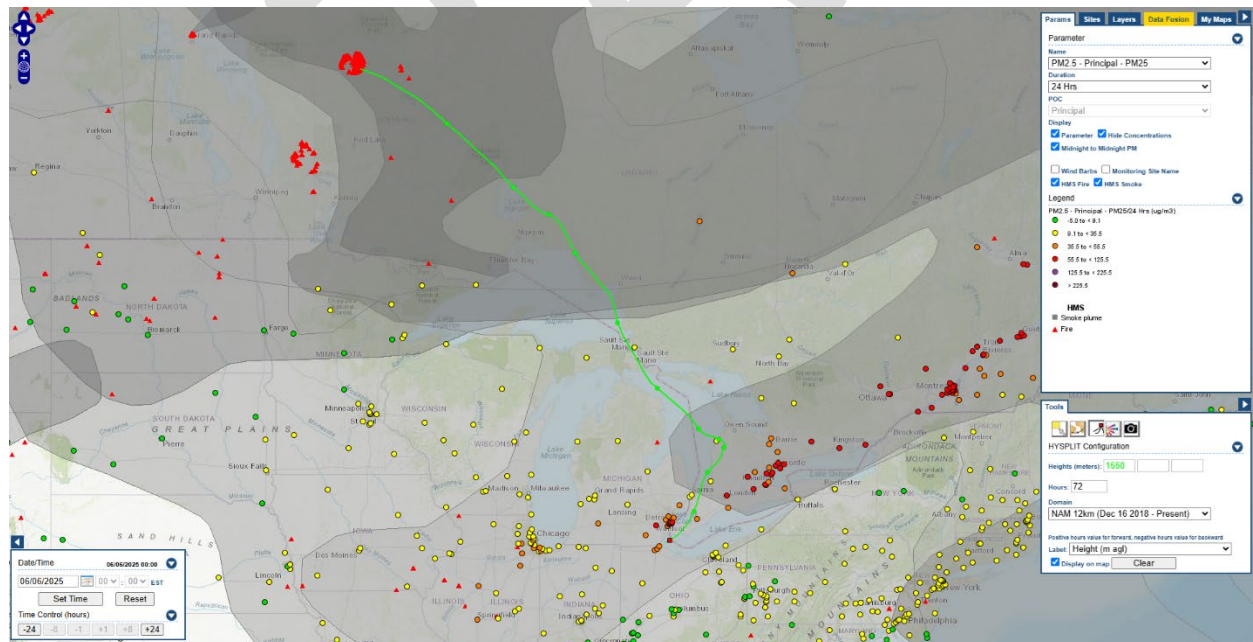


Figure 100. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 6, 2025, showing high AOD values stretching across Michigan, while the wildfire smoke over Ohio is largely not captured due to heavy cloud cover.

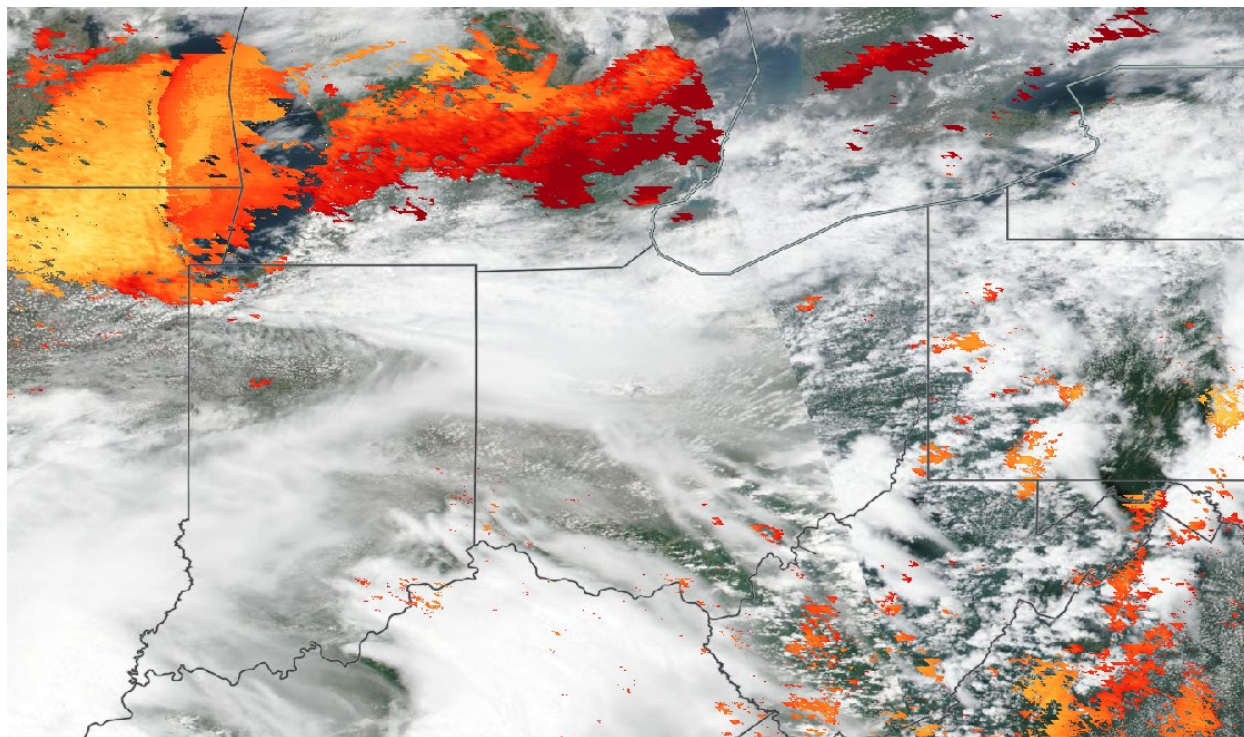


Table 11 and Figure 101 show the hourly average $PM_{2.5}$ concentrations on June 6, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations remaining elevated throughout the entirety of June 6, with a minimum of $33.5 \mu\text{g}/\text{m}^3$ at 09:00 EST and a maximum of $59.4 \mu\text{g}/\text{m}^3$ at 16:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on June 6, 2025.

Table 11. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 6, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 6, 2025
00:00	12.9	41.2
01:00	12.6	48.3
02:00	12.3	49.5
03:00	12.2	52.9
04:00	12.4	53.7
05:00	13.2	53.2
06:00	14.2	50.6
07:00	14.1	48.3
08:00	14.2	42.6
09:00	14.5	33.5
10:00	14.6	40.0
11:00	14.5	47.9
12:00	15.5	46.8
13:00	14.1	47.1
14:00	13.7	50.2
15:00	12.8	52.0
16:00	12.8	59.4
17:00	12.4	58.3
18:00	12.1	52.4
19:00	11.6	52.7
20:00	11.9	51.2
21:00	12.4	52.5
22:00	13.0	55.1
23:00	13.3	52.6

Figure 101. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 6, 2025, and 2024-2025 average June concentrations.

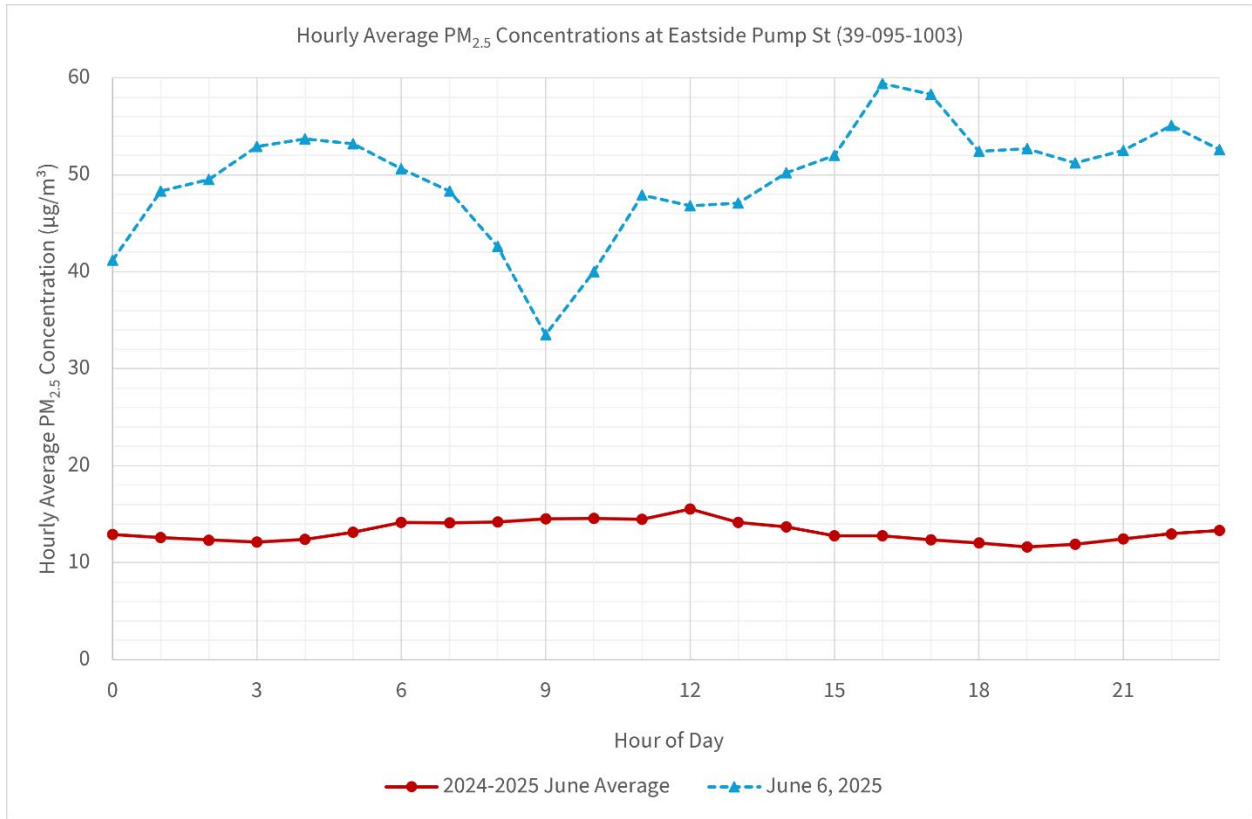
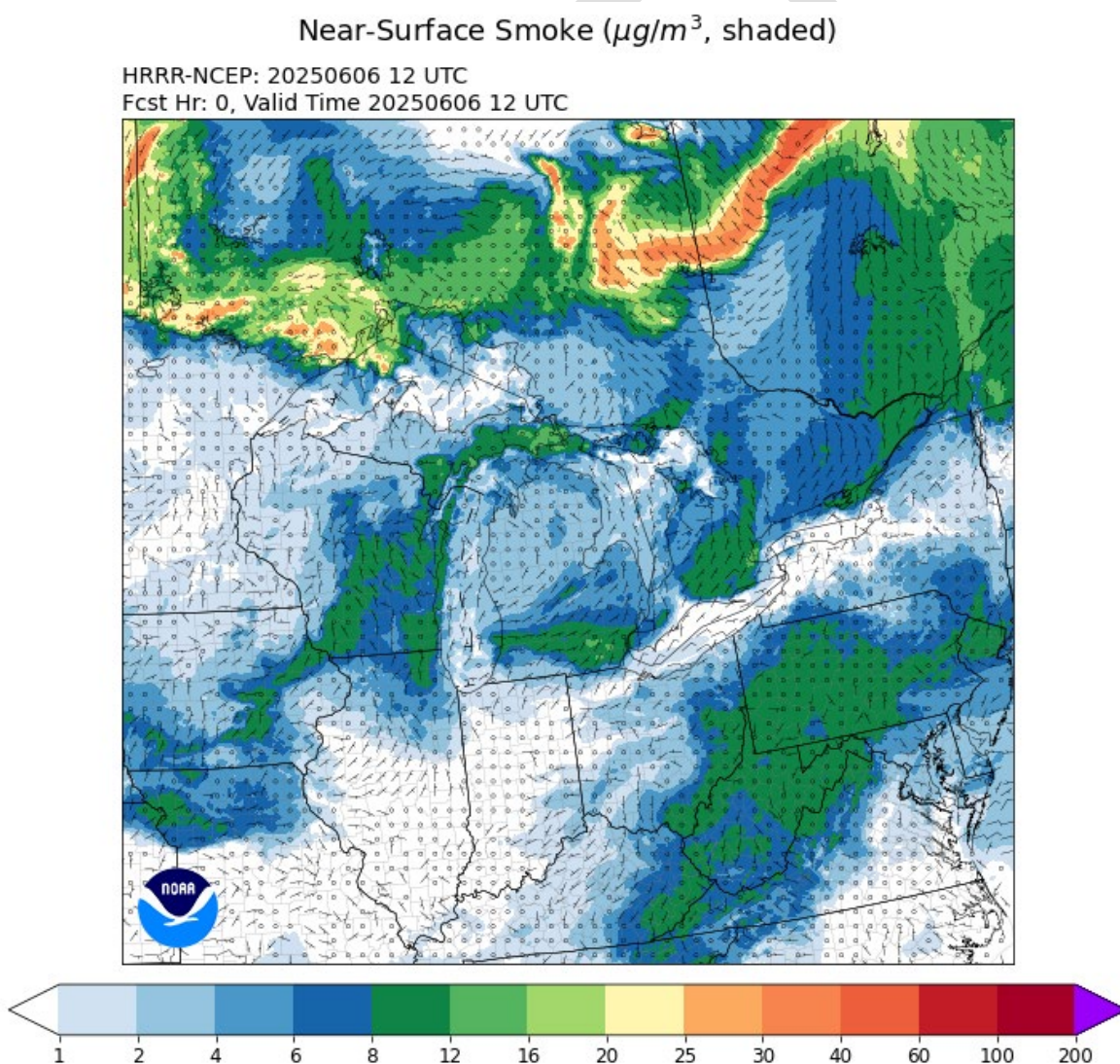


Figure 102 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 6, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately 6-8 $\mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted PM_{2.5} concentrations at the Eastside Pump St monitoring site on June 6, 2025.

Figure 102. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 6, 2025.



3.3.5. June 7, 2025

The HYSPLIT 120-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on June 7, 2025. Figure 103 shows the HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site, released at a height of 79.6 m AGL at 00:00 EST on June 7, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. A heavily wildfire smoke-impacted location 18 km (11.2 mi) north-northwest of Red Lake, Ontario, directly downwind of the wildfires burning 145 km (90.1 mi) northeast of Winnipeg, Manitoba, coincides with the point (at 1607.7 m AGL) at 17:00 EST on June 2 of the 120-hour back trajectory from the Eastside Pump St monitoring site in Lucas County, illustrating the transport of this wildfire smoke to Northwestern Ohio and serving as clear evidence that the smoke from the wildfires burning northeast of Winnipeg, Manitoba ultimately caused the high PM_{2.5} concentrations in Lucas County on June 7, 2025. The accompanying imagery map for June 7 presented in Figure 104 provides further evidence that smoke from the Canadian wildfires was present in Lucas County on June 7, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 103. HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site in Lucas County on June 7, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.

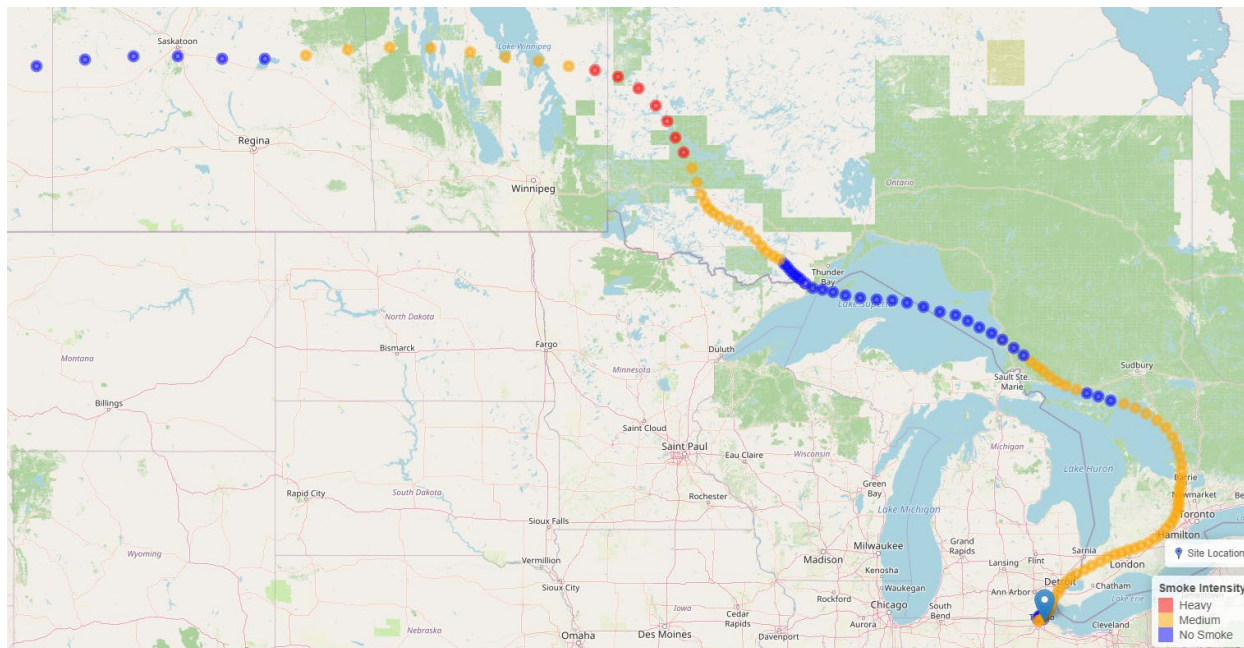


Figure 104. Terra satellite true color imagery of Ohio for June 7, 2025, showing visible wildfire smoke over Northern Ohio.

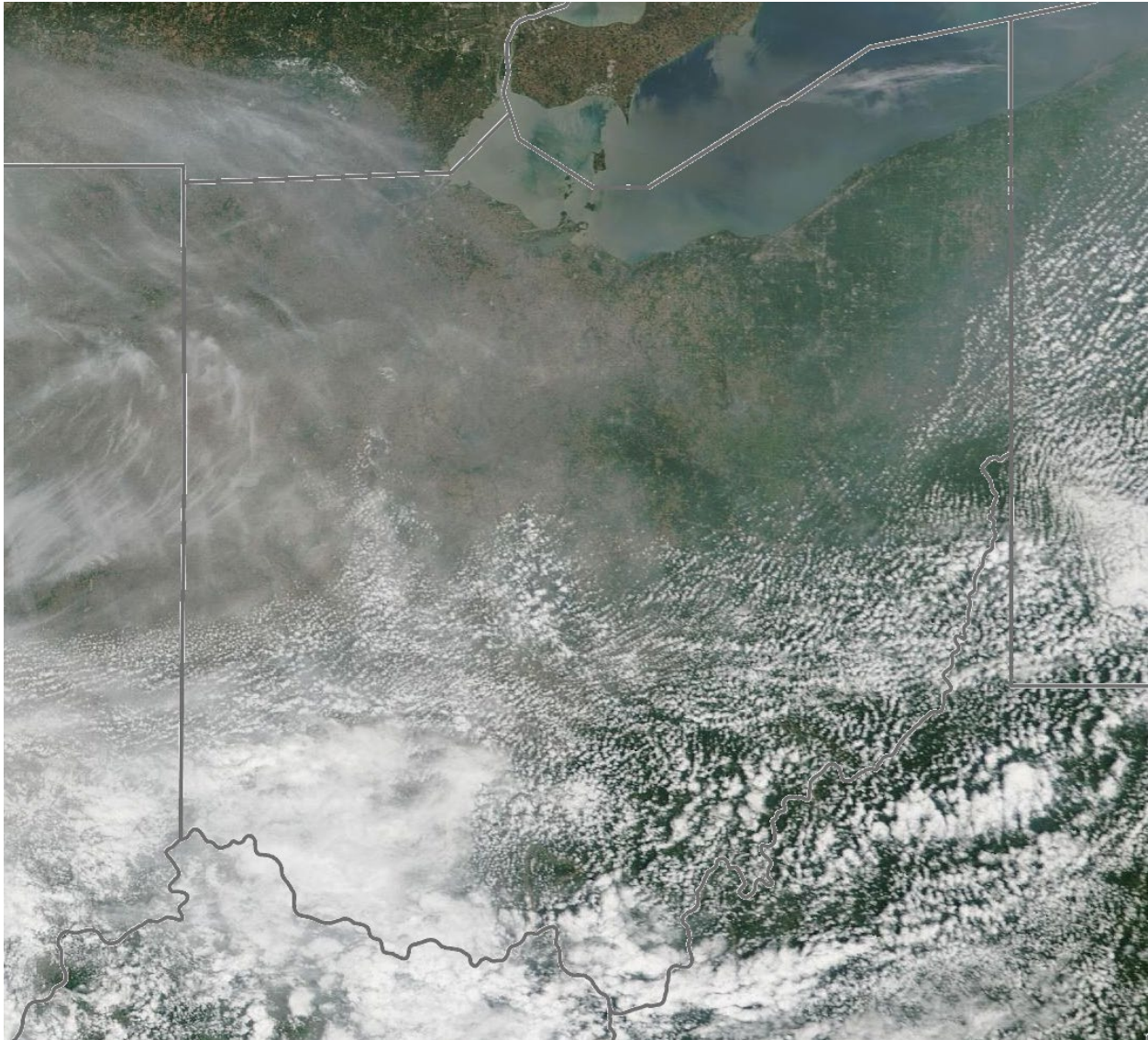


Table 12 and Figure 105 show the hourly average $PM_{2.5}$ concentrations on June 7, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations remaining elevated throughout the entirety of June 7, with a minimum of at $19.5 \mu\text{g}/\text{m}^3$ at 13:00 EST and a maximum of $56.5 \mu\text{g}/\text{m}^3$ at 00:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on June 7, 2025.

Table 12. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 7, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 7, 2025
00:00	12.9	56.5
01:00	12.6	56.4
02:00	12.3	50.0
03:00	12.2	49.2
04:00	12.4	42.0
05:00	13.2	36.9
06:00	14.2	33.2
07:00	14.1	29.2
08:00	14.2	24.2
09:00	14.5	26.8
10:00	14.6	29.4
11:00	14.5	22.4
12:00	15.5	19.7
13:00	14.1	19.5
14:00	13.7	20.2
15:00	12.8	19.6
16:00	12.8	20.1
17:00	12.4	20.2
18:00	12.1	23.5
19:00	11.6	24.6
20:00	11.9	25.6
21:00	12.4	25.0
22:00	13.0	28.5
23:00	13.3	45.5

Figure 105. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 7, 2025, and 2024-2025 average June concentrations.

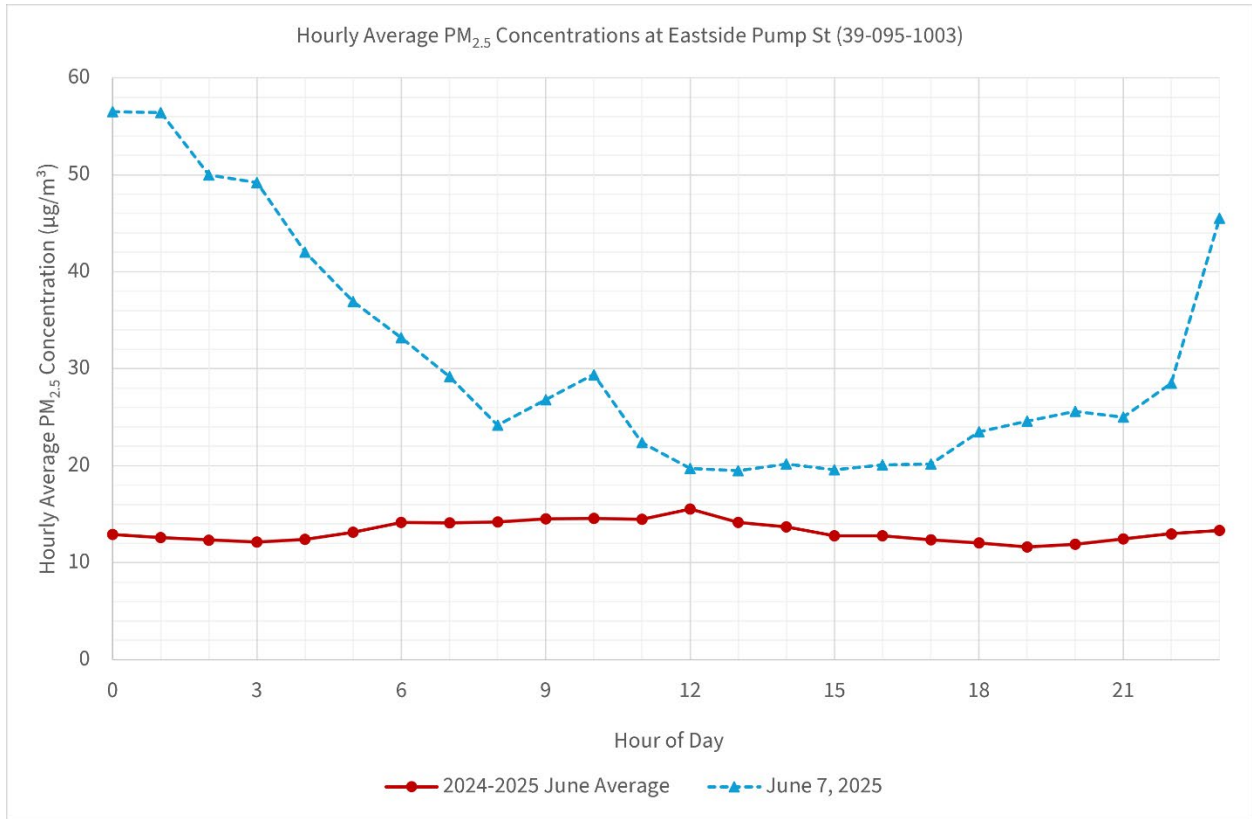
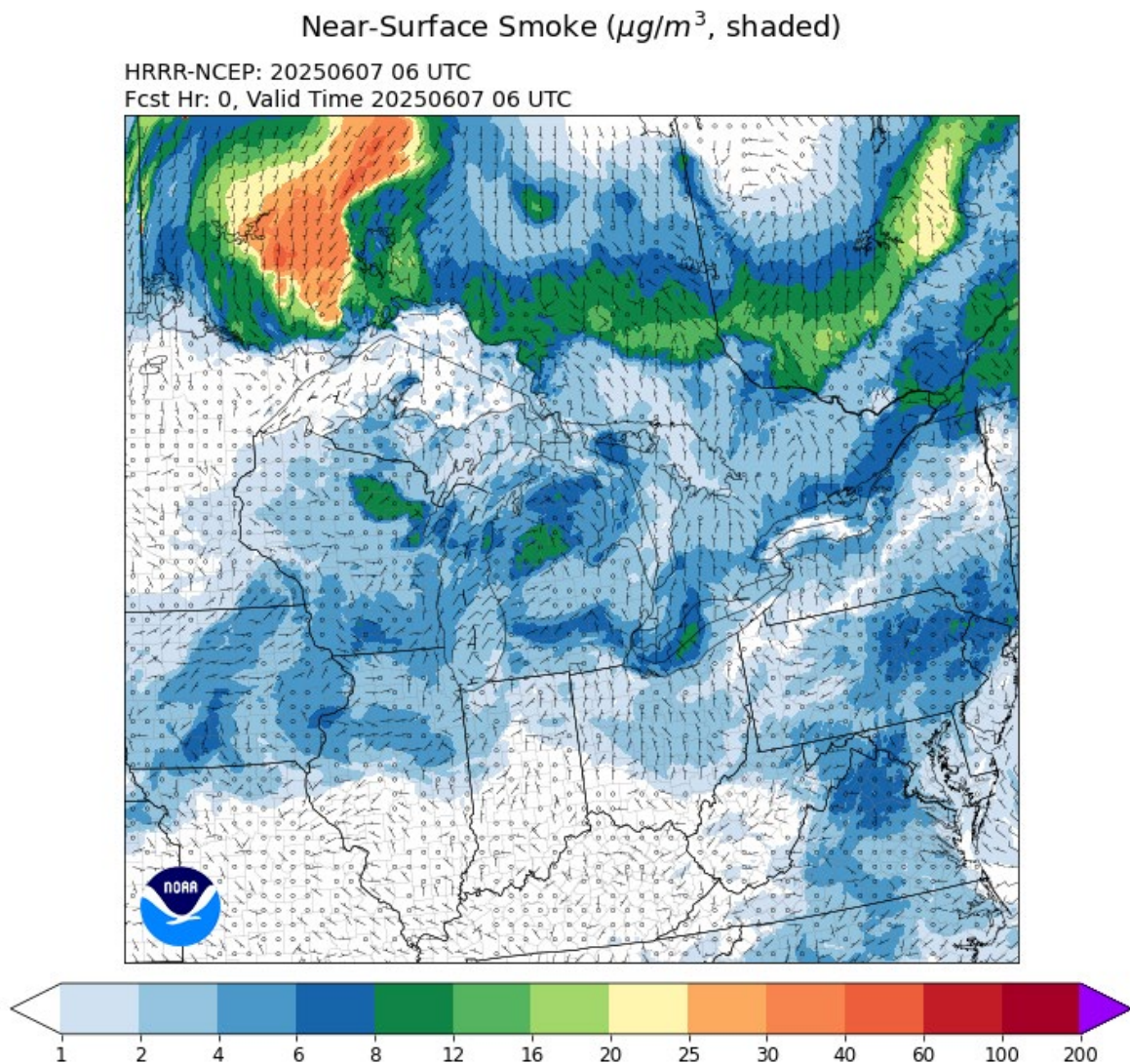


Figure 106 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 7, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $6 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 7, 2025.

Figure 106. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 7, 2025.



3.3.6. June 8, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on June 8, 2025. Figure 107 shows the HYSPLIT 72-hour back trajectory plot for June 8, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 5. Figure 108 shows the HYSPLIT 72-hour forward trajectory plot for June 5, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 8. Part of a larger wildfire complex burning northwest of Lac la Ronge in Saskatchewan, the wildfires burning 12 km (7.5 mi) east-northeast of La Ronge, Saskatchewan, coincide with the point (at 3760.2 m AGL) at 03:00 EST on June 5 of the 72-hour 250-m release height back trajectory from Toledo released at 03:00 EST on June 8. The HYSPLIT 72-hour forward trajectory released from these wildfires at 3750 m AGL at 03:00 EST on June 5 ultimately reached Toledo at a height of 264.5 m AGL at 03:00 EST on June 8. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning northwest of Lac la Ronge in Saskatchewan ultimately caused the high PM_{2.5} concentrations in Lucas County on June 8, 2025. The accompanying imagery map for June 8 presented in Figure 109 shows moderate and high AOD values with hazy conditions between cloud cover across portions of the Great Lakes region, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on June 8, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 107. HYSPLIT 72-hour back trajectory plot from June 8, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 5, 2025.

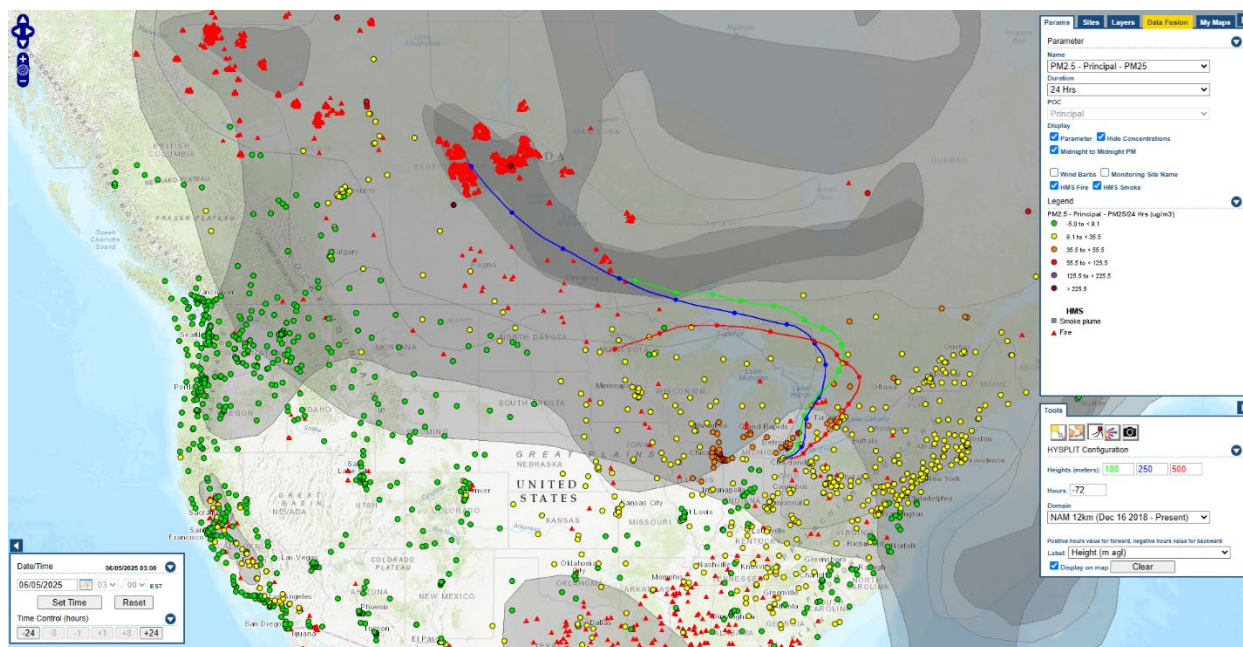


Figure 108. HYSPLIT 72-hour forward trajectory plot from June 5, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 8, 2025.

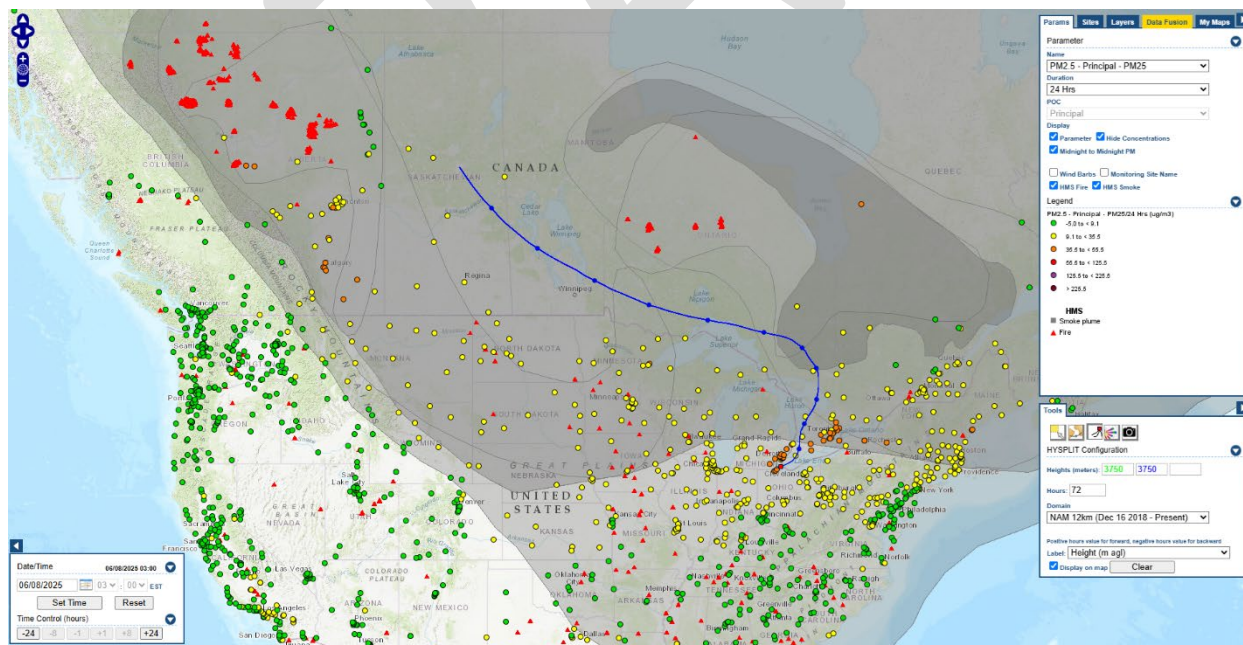


Figure 109. Aqua satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 8, 2025, showing moderate and high AOD values with hazy conditions between cloud cover across portions of the Great Lakes region, including Lucas County.

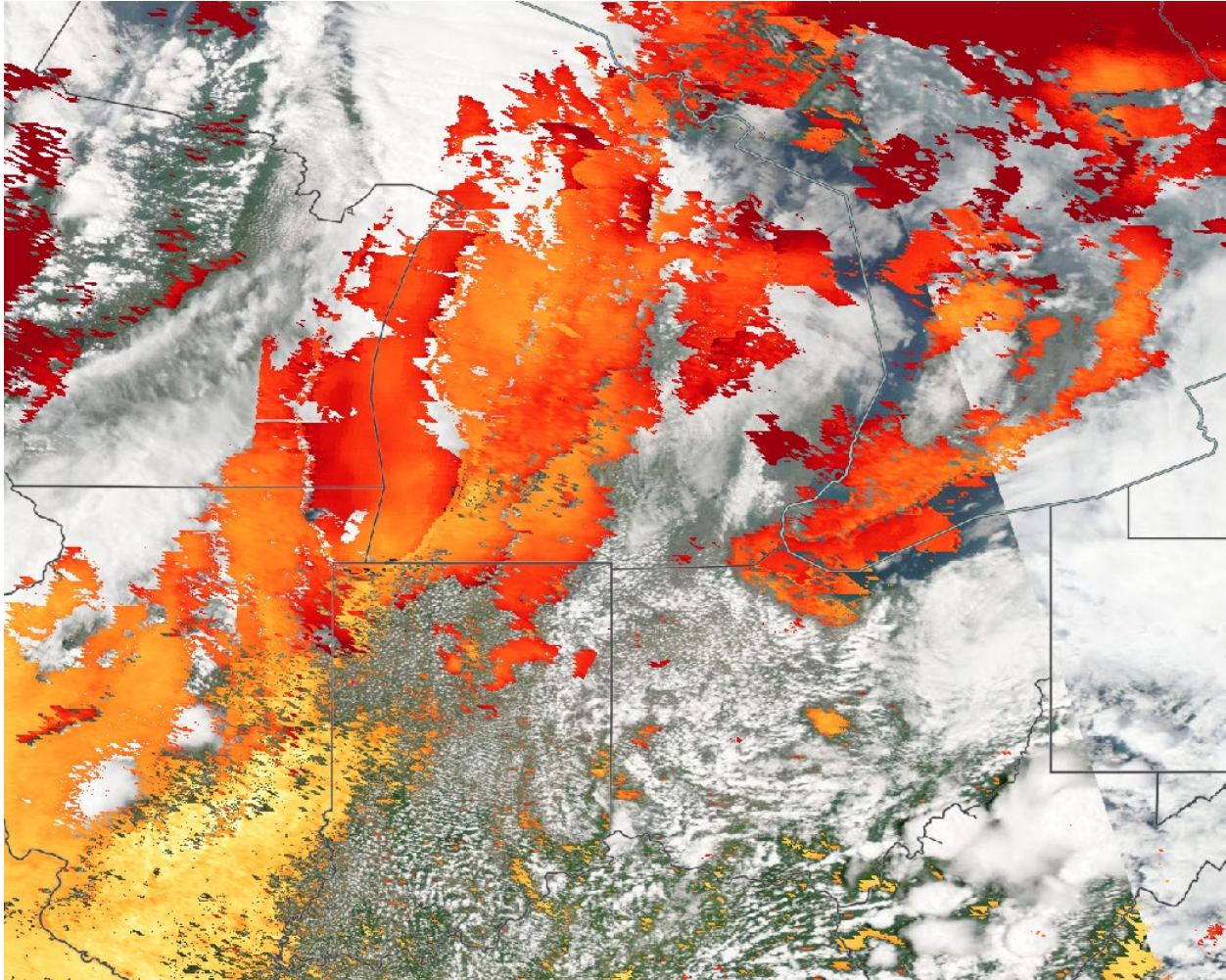


Table 13 and Figure 110 show the hourly average $PM_{2.5}$ concentrations on June 8, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations remaining elevated throughout the entirety of June 8, with a minimum of $34.5 \mu\text{g}/\text{m}^3$ at 13:00 EST and a maximum of $50.8 \mu\text{g}/\text{m}^3$ at 01:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on June 8, 2025.

Table 13. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 8, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 8, 2025
00:00	12.9	50.7
01:00	12.6	50.8
02:00	12.3	50.0
03:00	12.2	48.0
04:00	12.4	45.5
05:00	13.2	44.8
06:00	14.2	42.3
07:00	14.1	38.6
08:00	14.2	37.3
09:00	14.5	37.3
10:00	14.6	37.0
11:00	14.5	35.7
12:00	15.5	35.4
13:00	14.1	34.5
14:00	13.7	34.7
15:00	12.8	34.6
16:00	12.8	37.1
17:00	12.4	37.5
18:00	12.1	39.4
19:00	11.6	40.0
20:00	11.9	40.2
21:00	12.4	41.6
22:00	13.0	45.3
23:00	13.3	45.9

Figure 110. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on June 8, 2025, and 2024-2025 average June concentrations.

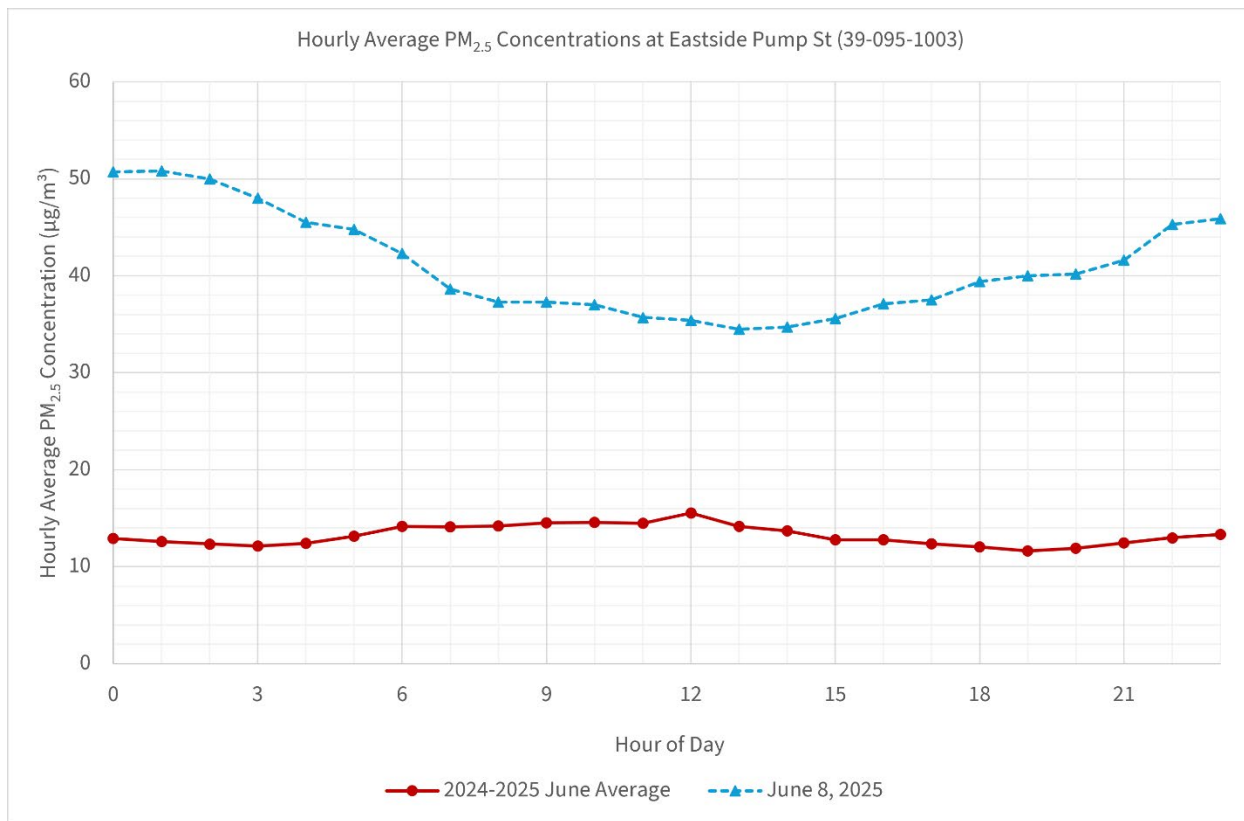
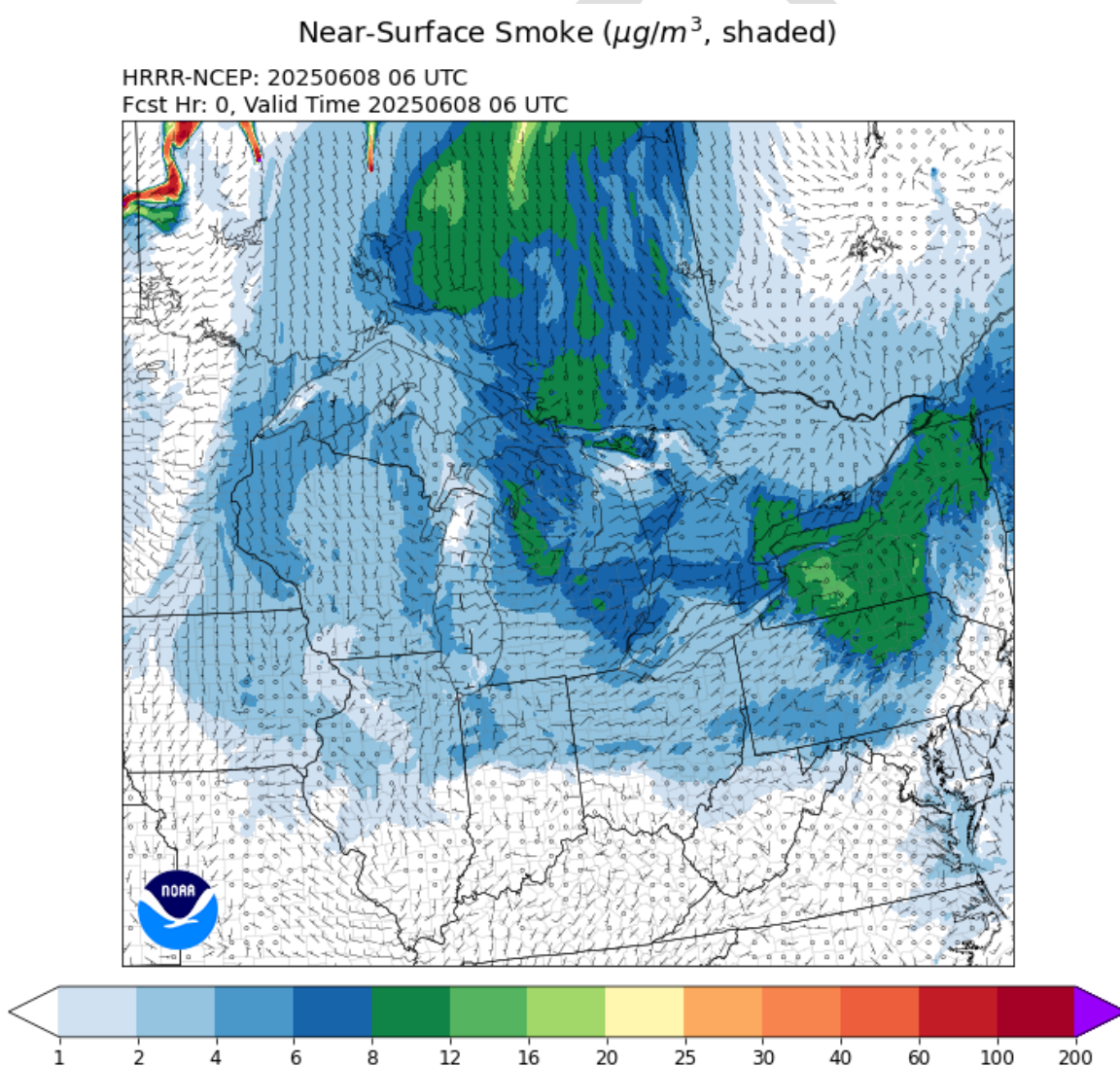


Figure 111 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 8, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately 4-6 $\mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on June 8, 2025.

Figure 111. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 8, 2025.



3.4. Fireworks Smoke-Driven $PM_{2.5}$ Episode on July 5, 2025

3.4.1. July 5, 2025

The smoke from the various nearby Fourth of July holiday celebration-related fireworks displays caused high surface $PM_{2.5}$ concentrations at the Eastside Pump St monitoring site in Lucas County on July 5, 2025. Figure 112 shows Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 5, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, in which moderate AOD values occur across Ohio, including Lucas County. On July 5, 2025, the Terra satellite had its closest daytime orbit track overpass of Toledo at 09:33 EST and the Aqua satellite had its closest daytime orbit track overpass of Toledo at 14:52 EST, so the moderate AOD values observed by the Terra satellite over Lucas County on July 5 would have represented lingering smoke from fireworks displays prior to the mixing height increasing enough in the afternoon to allow for the fireworks smoke to dissipate. Figures 113-116 show the wind barbs and hourly average $PM_{2.5}$ concentrations measured at monitoring sites across the region at 22:00 EST on July 4, 01:00 EST on July 5, 04:00 EST on July 5, and 07:00 EST on July 5, respectively, illustrating the lingering nature of the smoke near the surface due to widespread Fourth of July holiday celebration-related fireworks displays. The moderate AOD values observed over Ohio, including Lucas County, the large number of fireworks displays across the area, the calm winds in the Toledo area overnight, and the widespread elevated $PM_{2.5}$ concentrations at monitoring sites across the region, serve as clear evidence that the smoke from several fireworks displays across the area ultimately caused the high $PM_{2.5}$ concentrations at the Eastside Pump St monitoring site in Lucas County on July 5, 2025.

Figure 112. Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 5, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, showing moderate AOD values occur across Ohio, including Lucas County, due to lingering fireworks smoke.

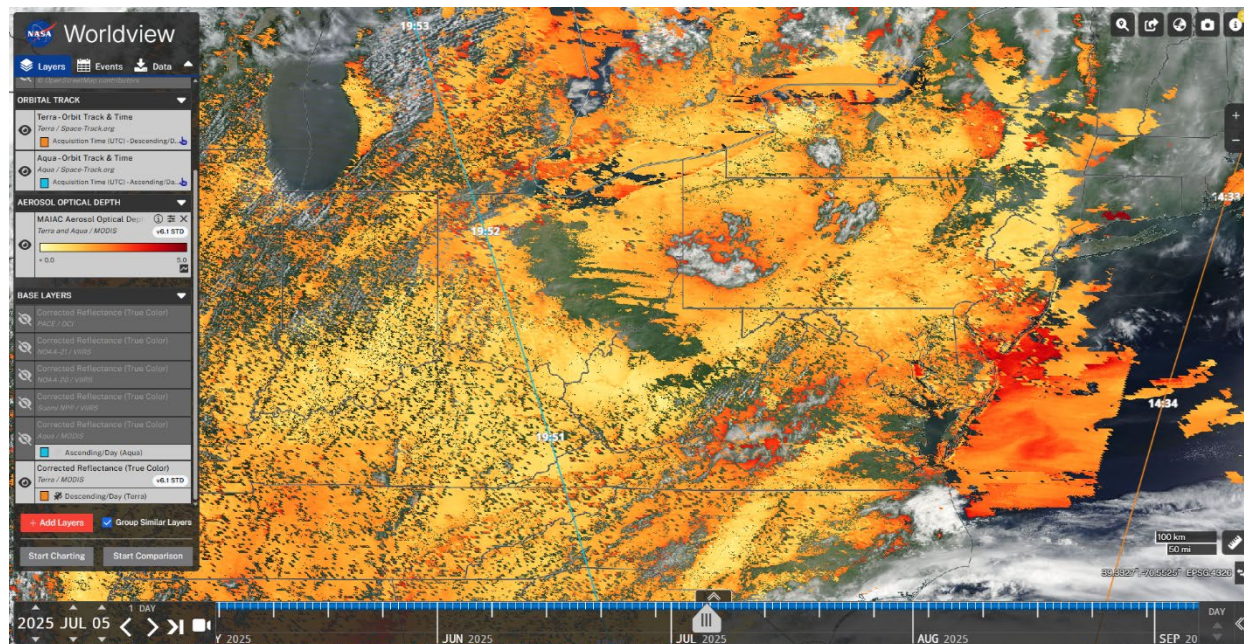


Figure 113. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 22:00 EST on July 4, 2025.

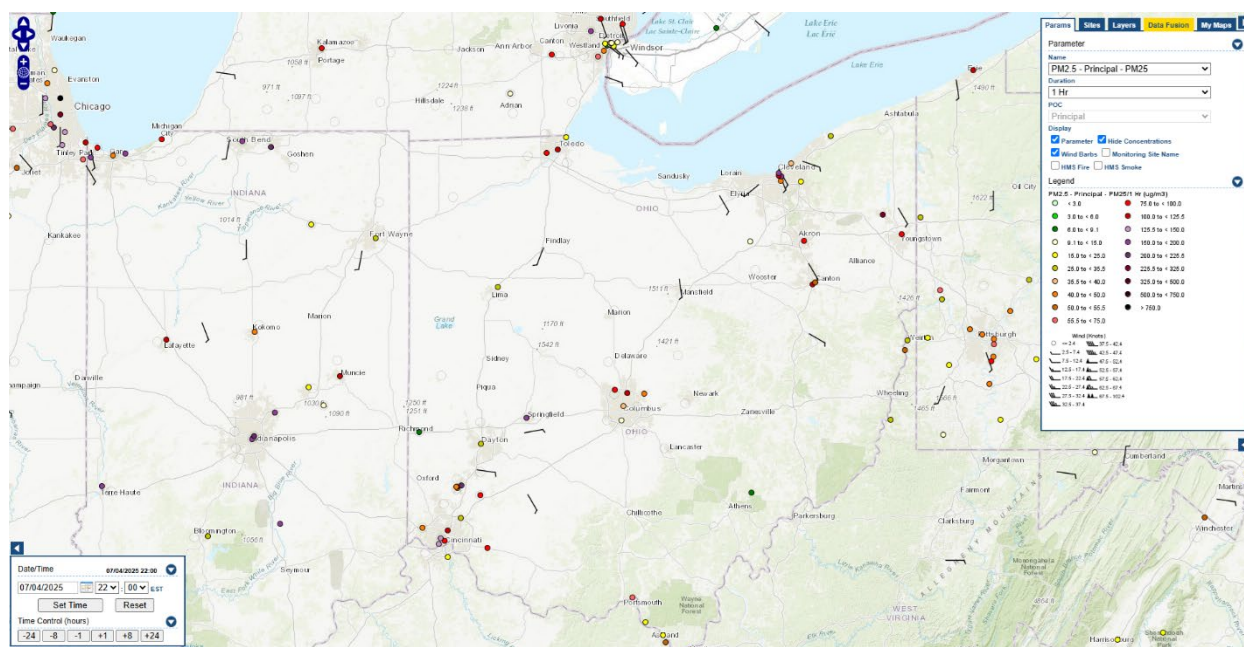


Figure 114. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 01:00 EST on July 5, 2025.

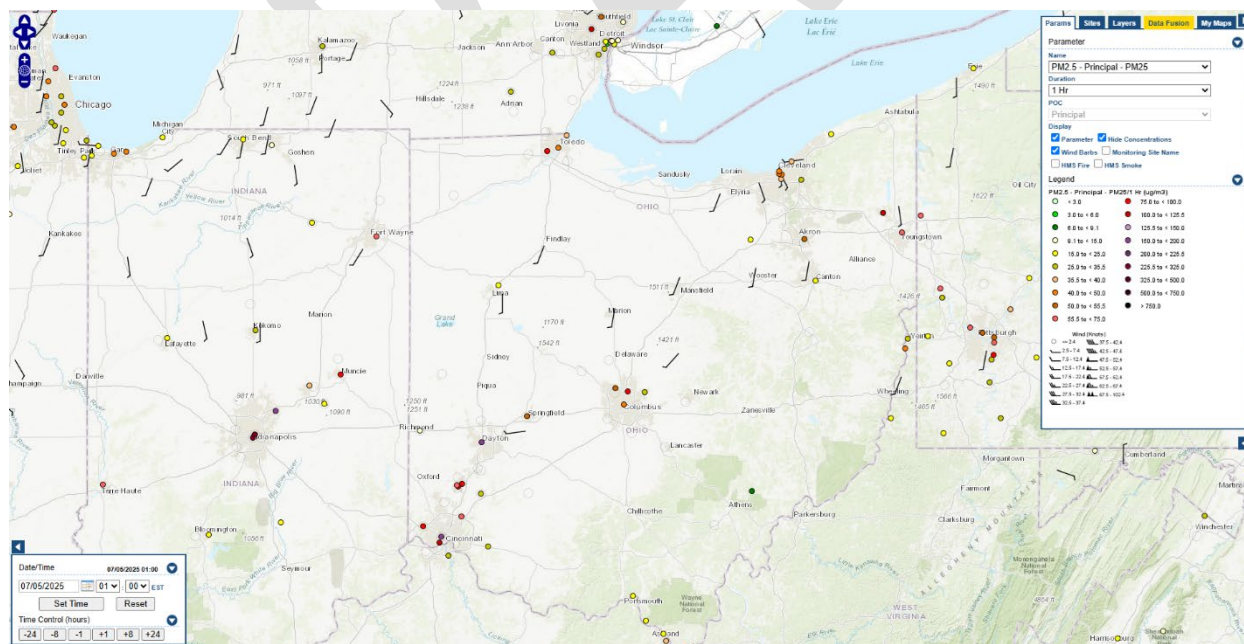


Figure 115. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 04:00 EST on July 5, 2025.

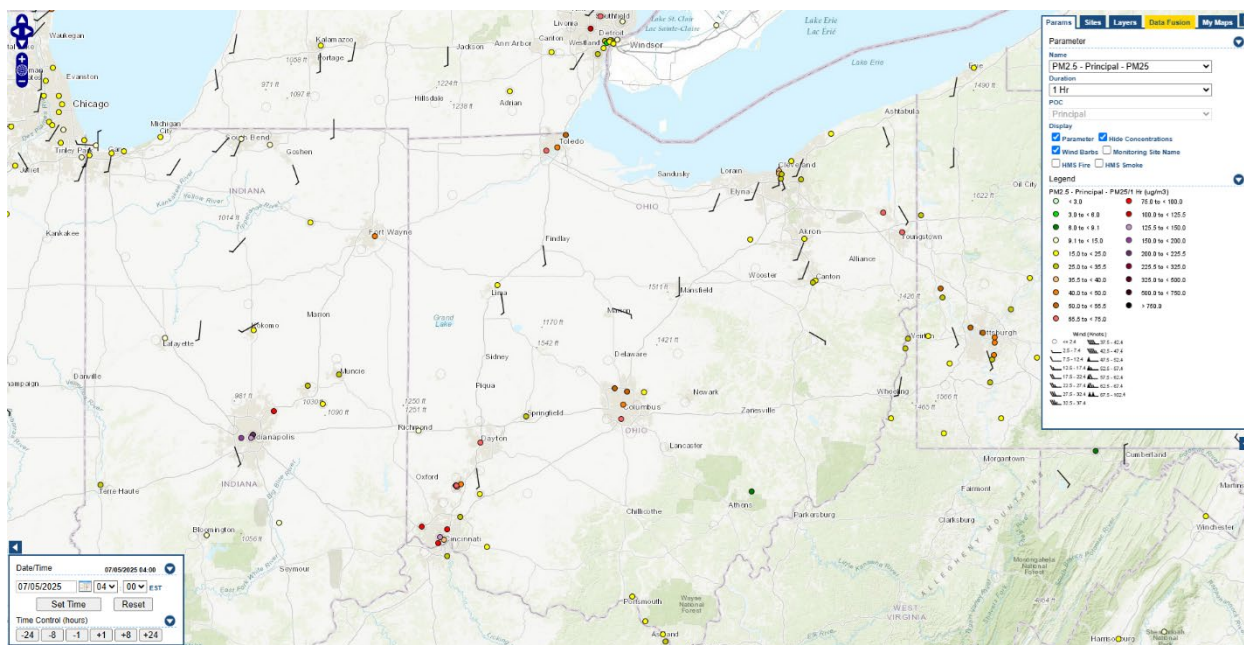


Figure 116. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 07:00 EST on July 5, 2025.

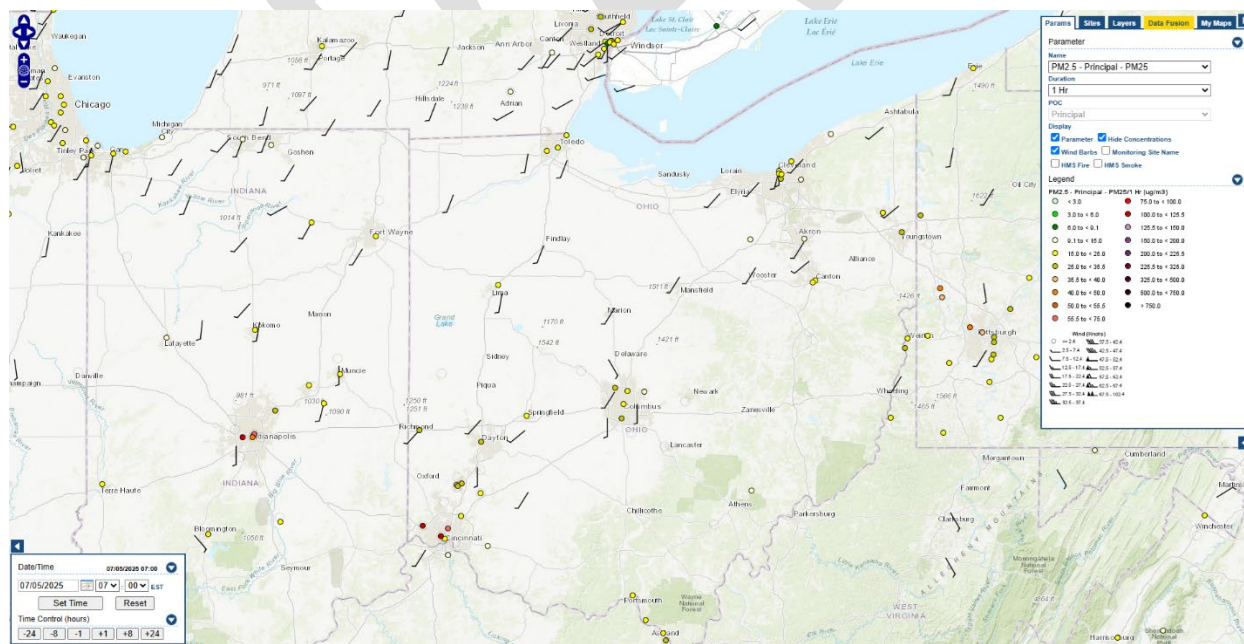
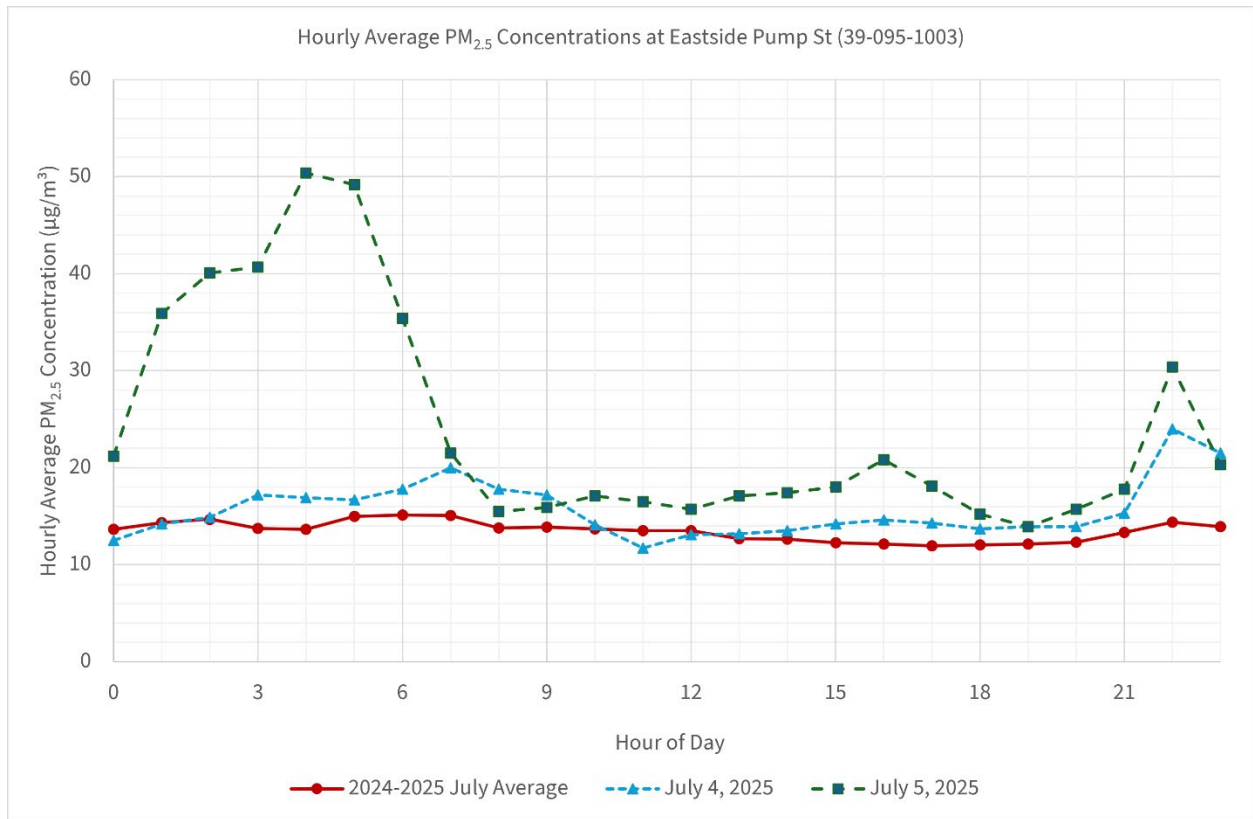


Table 14 and Figure 117 show the hourly average PM_{2.5} concentrations from July 4-5, 2025, and the 2024-2025 average July concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average PM_{2.5} concentrations increased as local fireworks displays began around 21:00 EST on July 4, with concentrations remaining elevated through the morning of July 5, peaking at 50.4 µg/m³ at 04:00 EST, only to rapidly increase again with more fireworks displays beginning by 21:00 EST on July 5, providing further evidence that smoke of several fireworks displays across the area impacted PM_{2.5} concentrations in Lucas County on July 5, 2025.

Table 14. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County from July 4-5, 2025, and 2024-2025 average July concentration data.

Hour of Day	2024-2025 Average July Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 4, 2025	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 5, 2025
00:00	13.7	12.5	21.2
01:00	14.3	14.2	35.9
02:00	14.7	14.9	40.1
03:00	13.7	17.2	40.7
04:00	13.7	16.9	50.4
05:00	15.0	16.7	49.2
06:00	15.1	17.8	35.4
07:00	15.1	20.0	21.5
08:00	13.8	17.8	15.5
09:00	13.9	17.2	15.9
10:00	13.7	14.1	17.1
11:00	13.5	11.7	16.5
12:00	13.5	13.1	15.7
13:00	12.7	13.2	17.1
14:00	12.6	13.5	17.4
15:00	12.3	14.2	18.0
16:00	12.1	14.6	20.8
17:00	11.9	14.3	18.1
18:00	12.0	13.7	15.2
19:00	12.1	13.9	13.9
20:00	12.3	13.9	15.7
21:00	13.3	15.3	17.8
22:00	14.4	24.0	30.4
23:00	13.9	21.5	20.3

Figure 117. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 4 and 5, 2025, and 2024-2025 average July concentrations.



3.5. Wildfire Smoke-Driven $PM_{2.5}$ Episode from July 14-15, 2025

3.5.1. July 14, 2025

The HYSPLIT 120-hour back and 90-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface $PM_{2.5}$ concentrations in Lucas County on July 14, 2025. Figure 118 shows the HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site, released at a height of 548.4 m AGL at 12:00 EST on July 14, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. Figure 119 shows the HYSPLIT 90-hour forward trajectory plot for July 10, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for July 14. A heavily wildfire smoke-impacted location 14 km (8.7 mi) northwest of Pinehouse, Saskatchewan, directly downwind of the wildfires burning 18 km (11.2 mi) northwest of Pinehouse, Saskatchewan, coincides with the point (at 4069.0 m AGL) at 18:00 EST on July 10 of the 120-hour back trajectory from the Eastside Pump St monitoring site in Lucas County, illustrating the transport of this wildfire smoke to Northwestern Ohio. The corresponding HYSPLIT 90-hour forward trajectory released from these wildfires at 4100 m AGL at 18:00 EST on July 10, composed of a 24-hour forward trajectory from the endpoint of the 66-hour forward trajectory from the wildfires, ultimately reached the Toledo area at a height of 469.4 m AGL at 12:00 EST on July 14. The coincidence of the 120-hour back and 90-hour forward trajectories between the wildfires and Toledo serves as clear evidence that the smoke from the wildfires burning northwest of Pinehouse, Saskatchewan ultimately caused the high $PM_{2.5}$ concentrations in Lucas County on July 14, 2025. The accompanying imagery map for July 14 presented in Figure 120 shows visible wildfire smoke over Northwestern Ohio, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on July 14, 2025, and that this wildfire smoke was the cause of the high concentrations of $PM_{2.5}$ at monitoring sites in Lucas County.

Figure 118. HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site in Lucas County at 12:00 EST on July 14, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.

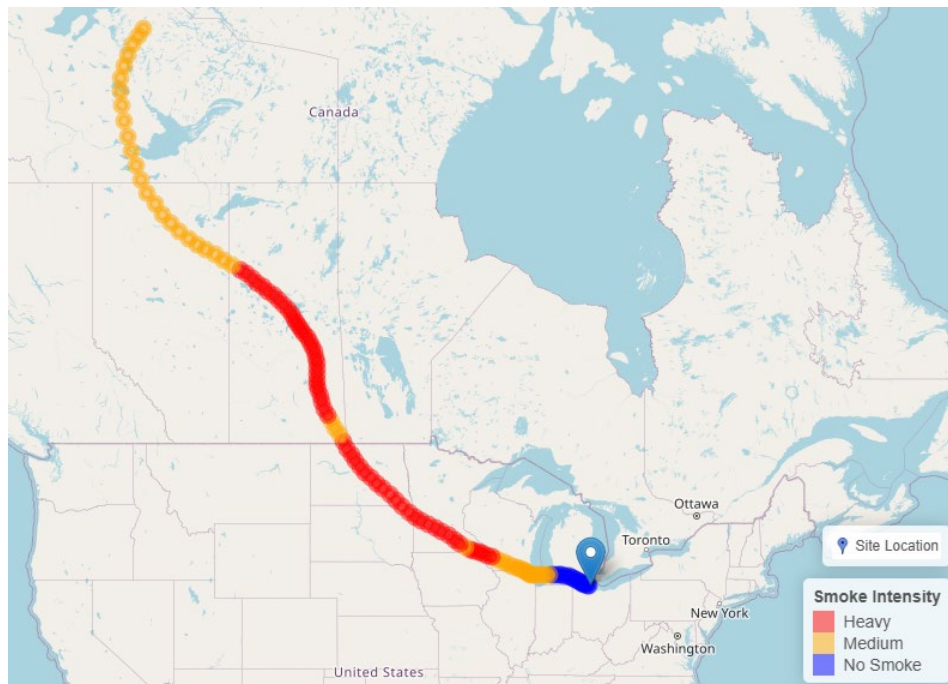


Figure 119. HYSPLIT 90-hour forward trajectory plot from 18:00 EST on July 10, 2025, with fire locations, monitored surface $PM_{2.5}$ concentrations, and HMS smoke polygons for July 14, 2025.

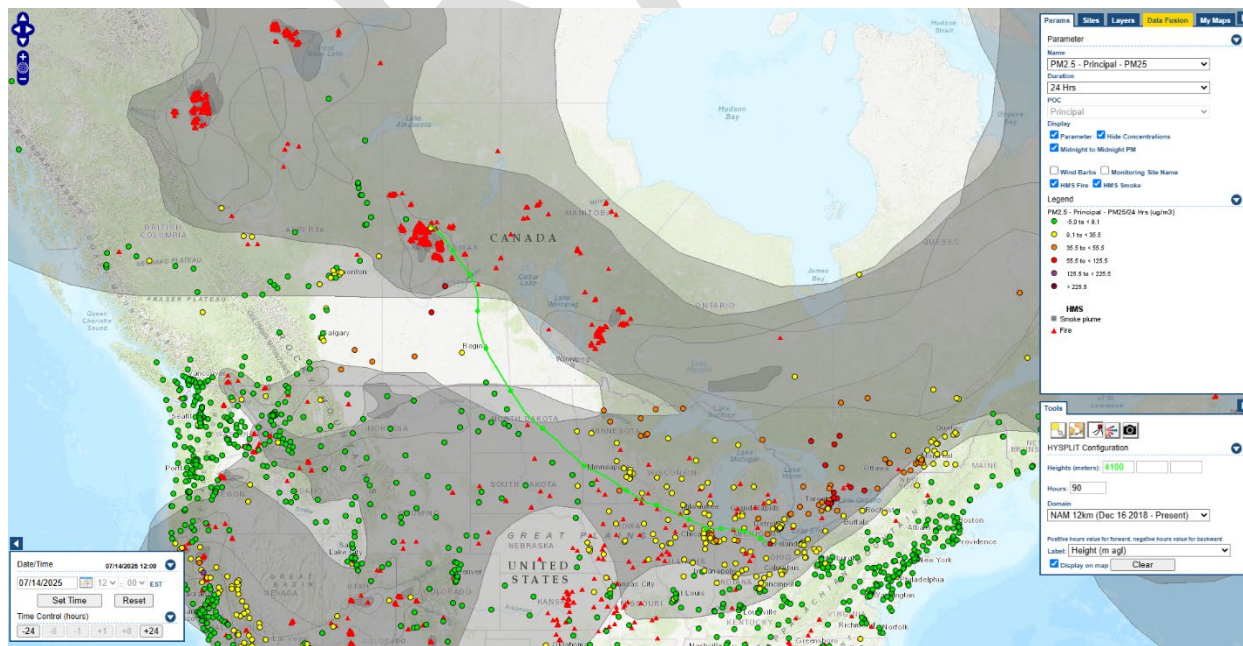


Figure 120. Aqua satellite true color imagery of Ohio for July 14, 2025, showing visible wildfire smoke across Northwestern Ohio, including Lucas County.



Table 15 and Figure 121 show the hourly average PM_{2.5} concentrations on July 14, 2025, and the 2024-2025 average July concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average PM_{2.5} remained elevated as wildfire smoke rolled in overnight and remained elevated the rest of the day on July 14 before sharply increasing in the late afternoon as more wildfire smoke aloft began descending upon the surface, peaking at 51.0 µg/m³ at 22:00 EST, providing further evidence that wildfire smoke impacted PM_{2.5} concentrations in Lucas County on July 14, 2025.

Table 15. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 14, 2025, and 2024-2025 average July concentration data.

Hour of Day	2024-2025 Average July Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on July 14, 2025
00:00	13.7	24.6
01:00	14.3	24.4
02:00	14.7	22.5
03:00	13.7	20.6
04:00	13.7	21.1
05:00	15.0	22.4
06:00	15.1	24.8
07:00	15.1	29.6
08:00	13.8	32.1
09:00	13.9	31.0
10:00	13.7	27.9
11:00	13.5	29.3
12:00	13.5	31.1
13:00	12.7	30.0
14:00	12.6	29.8
15:00	12.3	37.9
16:00	12.1	45.4
17:00	11.9	46.0
18:00	12.0	49.1
19:00	12.1	47.4
20:00	12.3	49.6
21:00	13.3	50.0
22:00	14.4	51.0
23:00	13.9	50.5

Figure 121. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 14, 2025, and 2024-2025 average July concentrations.

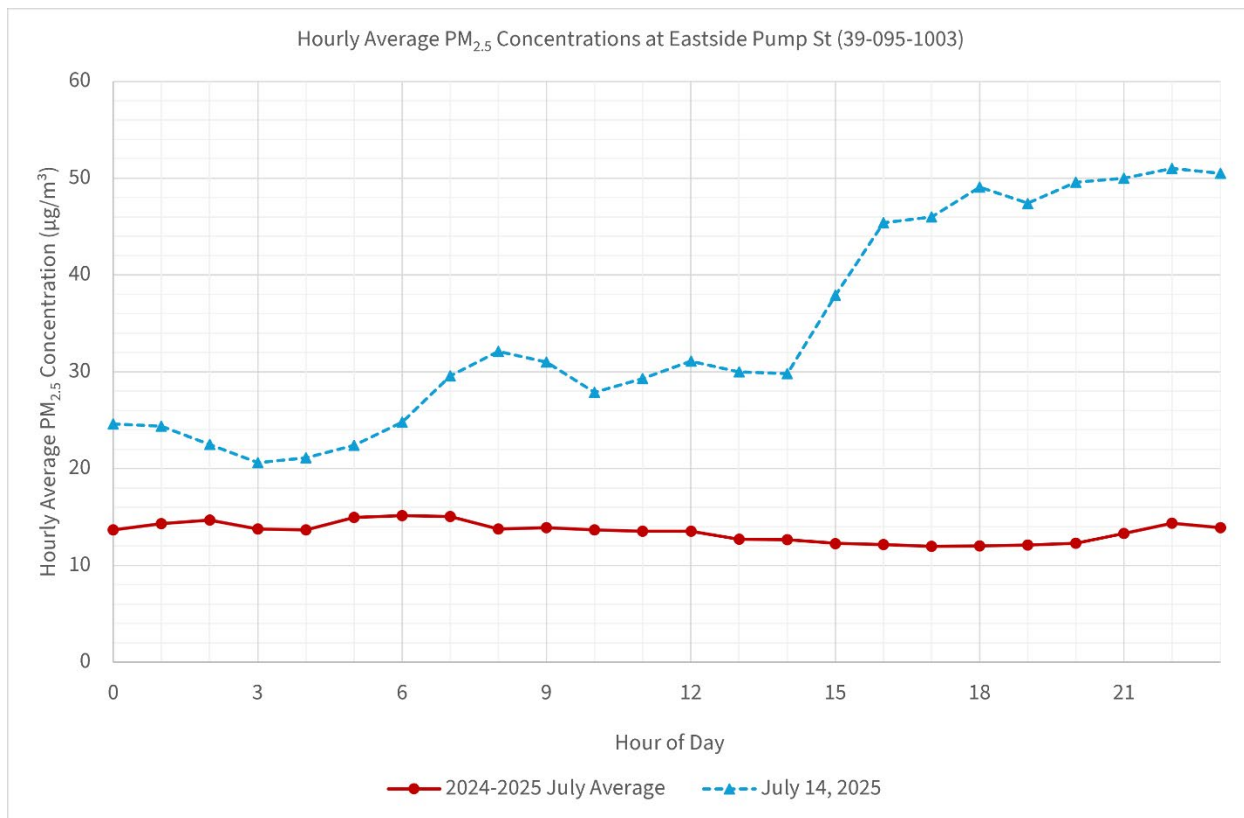
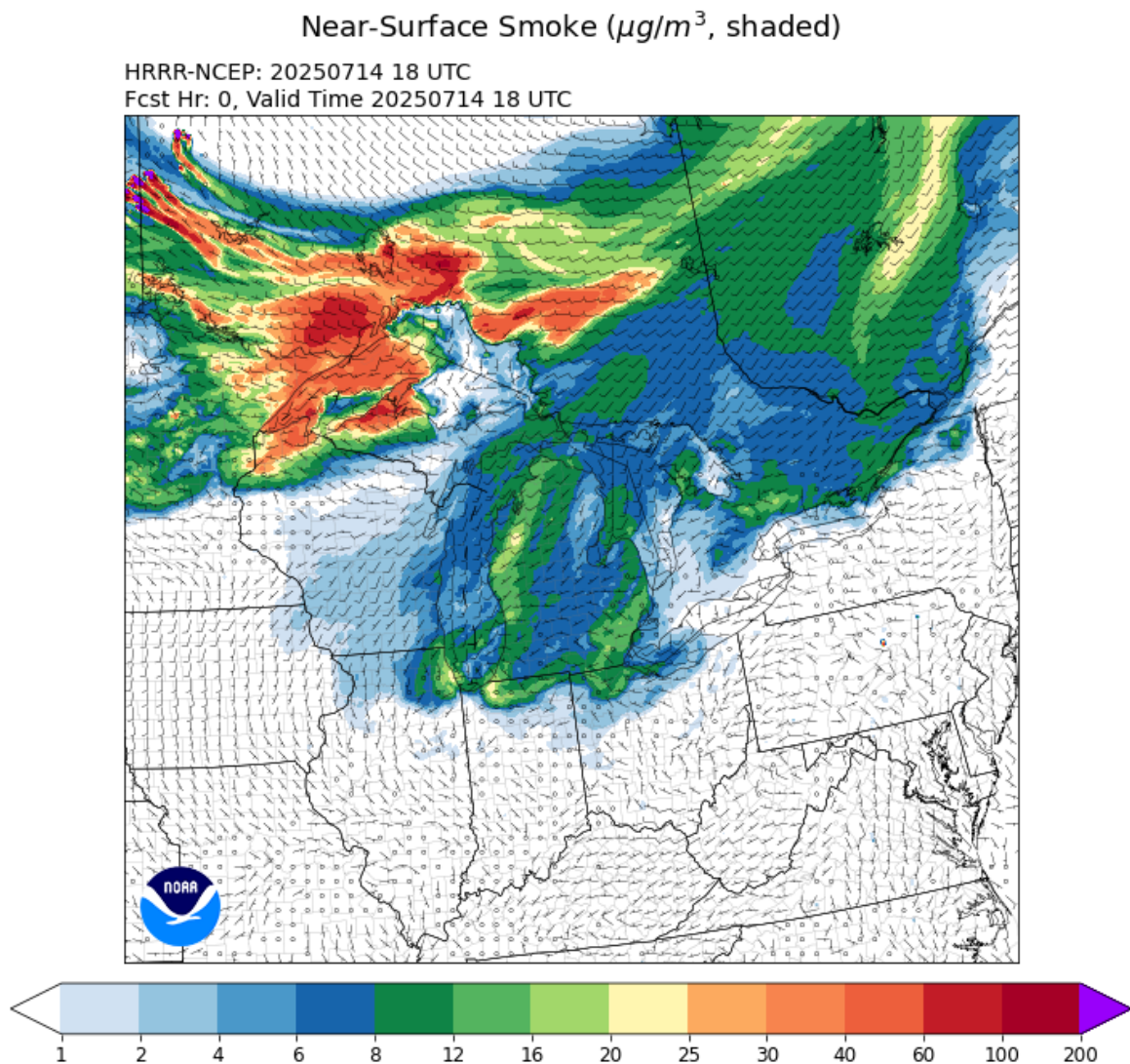


Figure 122 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 18Z (13:00 EST) on July 14, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $12 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on July 14, 2025.

Figure 122. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 18Z (13:00 EST) on July 14, 2025.



3.5.2. July 15, 2025

The HYSPLIT 92-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on July 15, 2025. Figure 123 shows the HYSPLIT 92-hour back trajectory plot for July 15, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 11. The wildfires burning 45 km (28.0 mi) south-southwest of Buffalo Narrows, Saskatchewan, coincide with the point (at 4376.9 m AGL) at 04:00 EST on July 11 of the 92-hour 600-m release height back trajectory from Toledo, composed of a 22-hour back trajectory from the endpoint of the 70-hour back trajectory from the Eastside Pump St monitoring site in Toledo, released at 00:00 EST on July 15. The 92-hour back trajectory between the wildfires and Toledo serves as clear evidence that the smoke from the wildfires burning south-southwest of Buffalo Narrows, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Lucas County on July 15, 2025. The accompanying imagery map for July 15 presented in Figure 124 shows visible wildfire smoke over Northern Ohio, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on July 15, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 123. HYSPLIT 92-hour back trajectory plot from July 15, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 11, 2025.

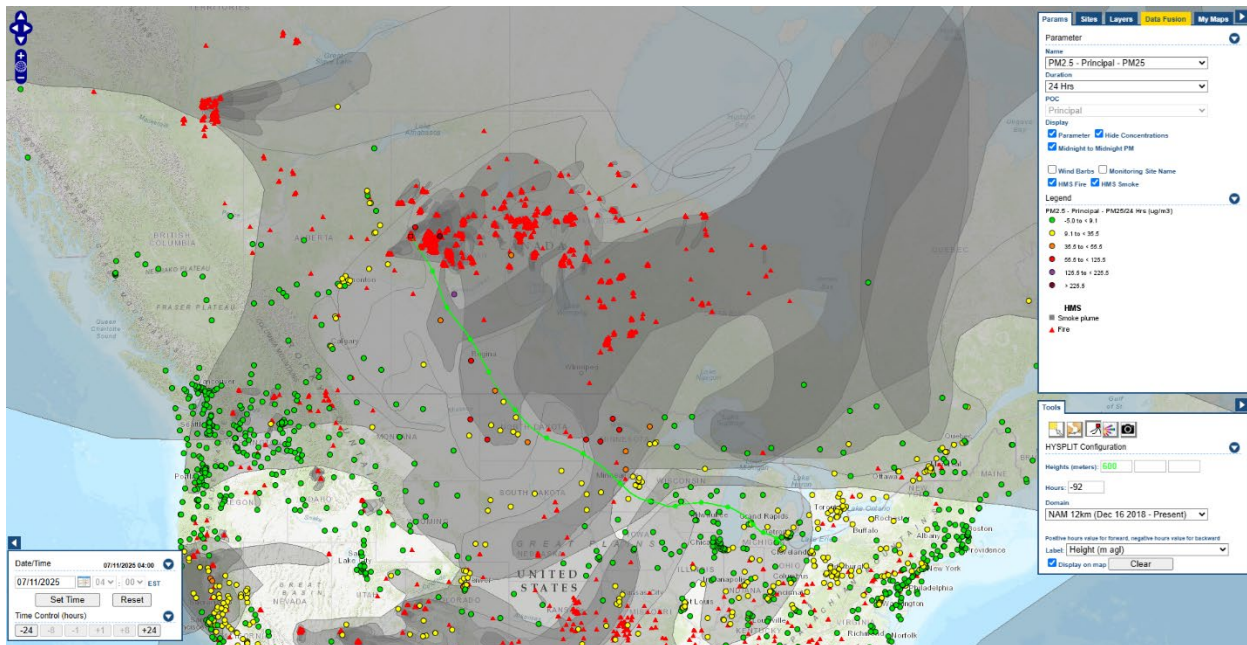


Figure 124. Terra satellite true color imagery of Ohio for July 15, 2025, showing visible wildfire smoke across Northern Ohio, including Lucas County.

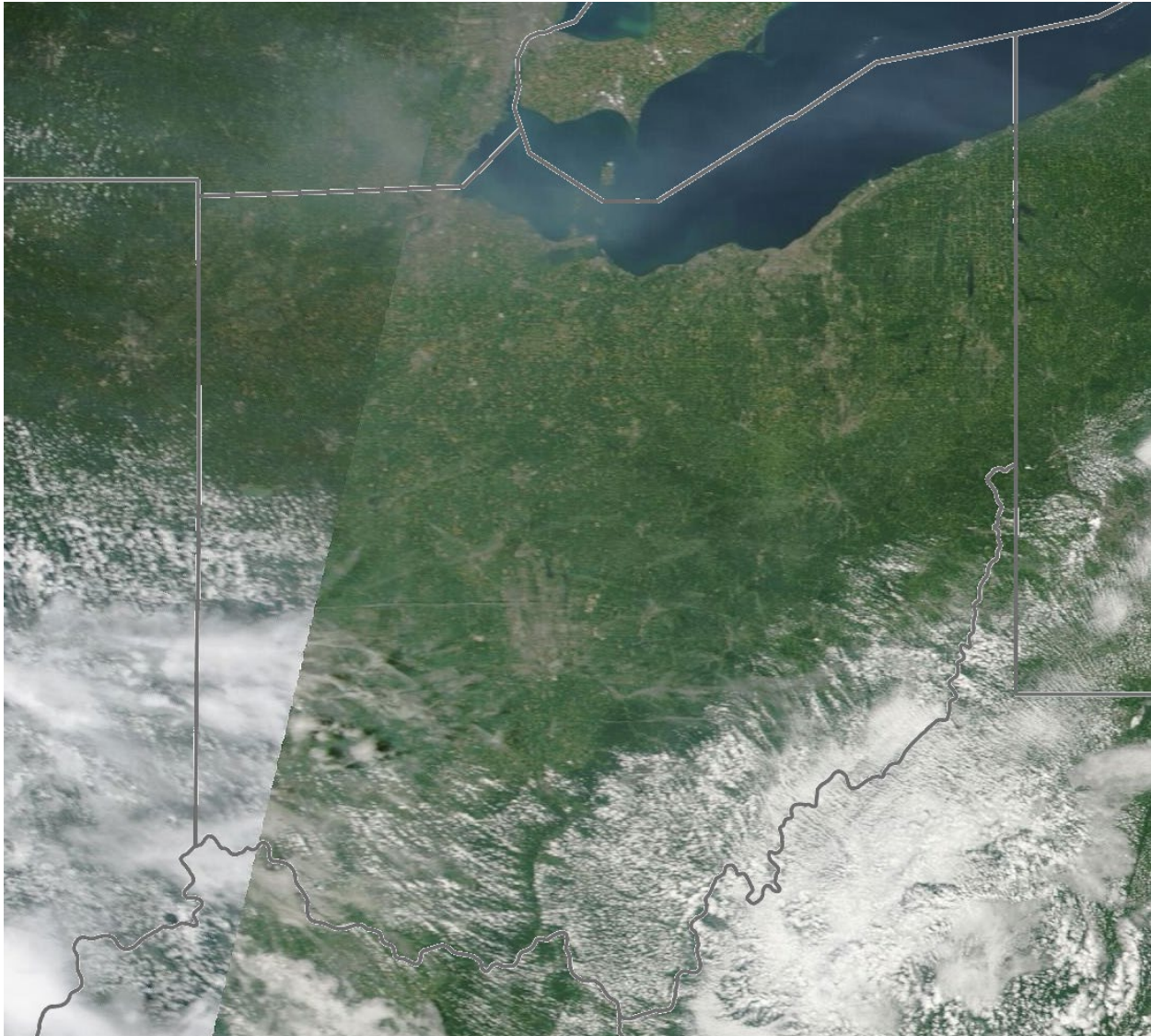


Table 16 and Figure 125 show the hourly average $PM_{2.5}$ concentrations on July 15, 2025, and the 2024-2025 average July concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ remained elevated as wildfire smoke lingered near the surface throughout the entire day on July 15, peaking at $63.8 \mu\text{g}/\text{m}^3$ at 06:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on July 15, 2025.

Table 16. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 15, 2025, and 2024-2025 average July concentration data.

Hour of Day	2024-2025 Average July Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 15, 2025
00:00	13.7	57.4
01:00	14.3	59.1
02:00	14.7	57.5
03:00	13.7	56.4
04:00	13.7	52.4
05:00	15.0	58.2
06:00	15.1	63.8
07:00	15.1	61.6
08:00	13.8	51.3
09:00	13.9	55.3
10:00	13.7	55.3
11:00	13.5	48.0
12:00	13.5	49.4
13:00	12.7	45.7
14:00	12.6	45.6
15:00	12.3	45.3
16:00	12.1	43.0
17:00	11.9	41.7
18:00	12.0	42.2
19:00	12.1	41.4
20:00	12.3	40.5
21:00	13.3	40.3
22:00	14.4	40.1
23:00	13.9	41.0

Figure 125. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 15, 2025, and 2024-2025 average July concentrations.

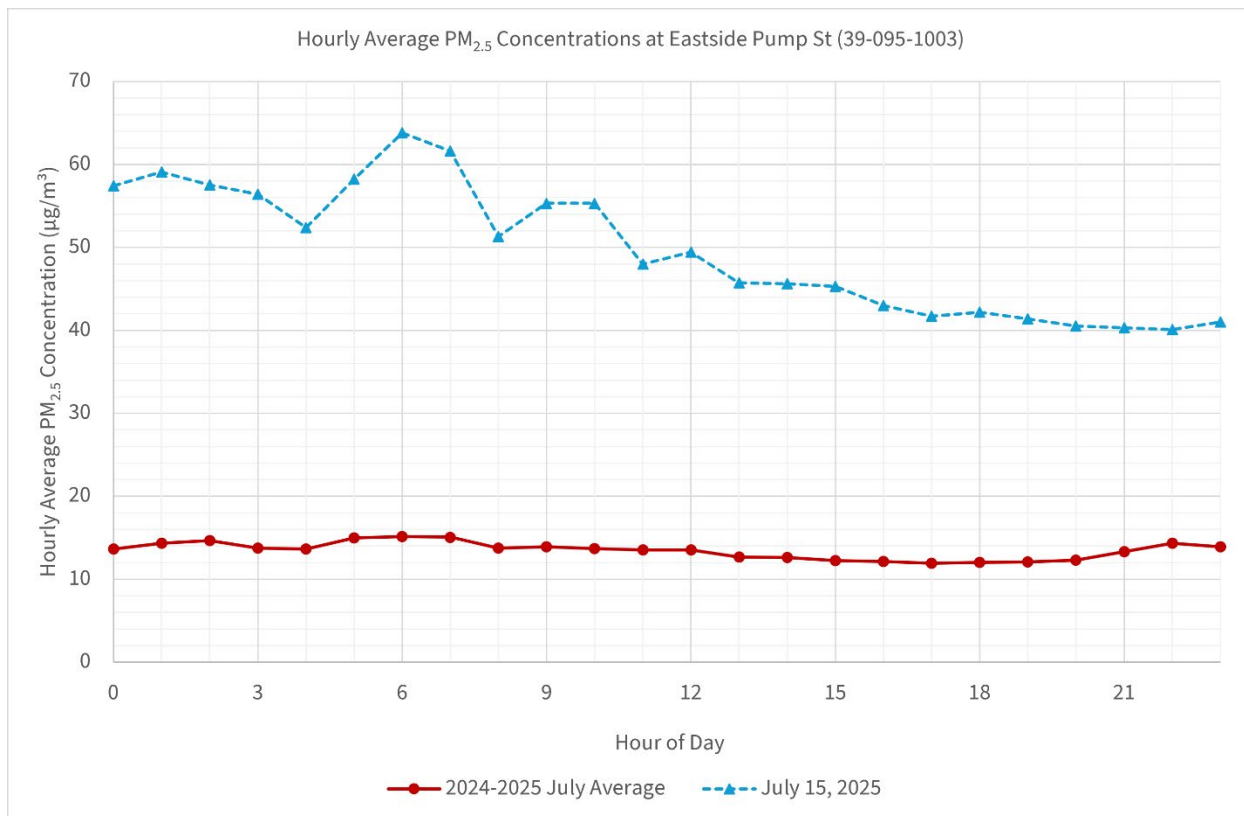
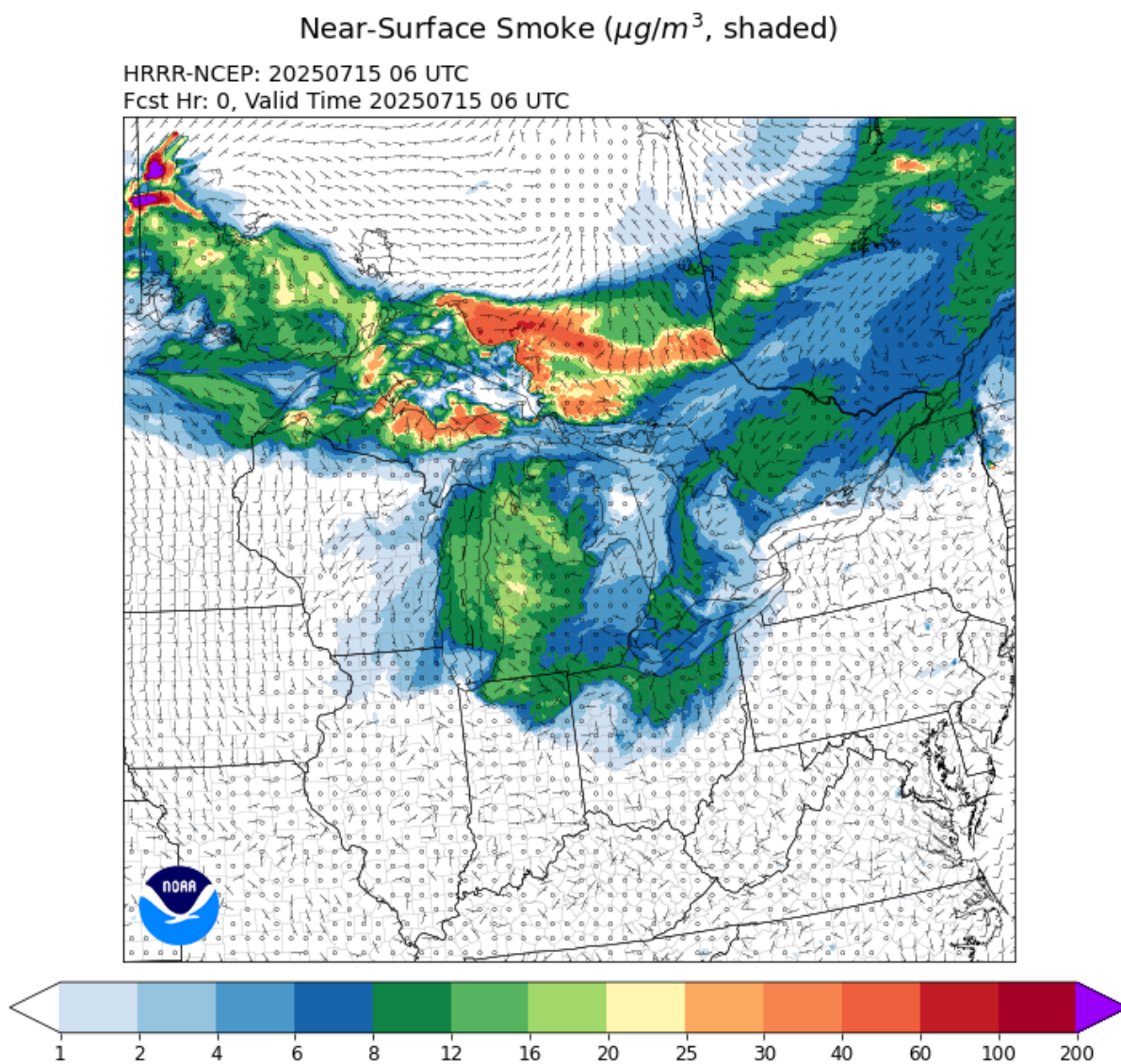


Figure 126 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on July 15, 2025. The HRRR model initialization showed near-surface smoke across Northern Ohio, including near-surface smoke concentrations of approximately $12 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on July 15, 2025.

Figure 126. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on July 15, 2025.



3.6. Wildfire Smoke-Driven PM_{2.5} Episode from July 31 – August 1, 2025

3.6.1. July 31, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on July 31, 2025. Figure 127 shows the HYSPLIT 72-hour back trajectory plot for July 31, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 28. Figure 128 shows the HYSPLIT 72-hour forward trajectory plot for July 28, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 31. The wildfires burning 45 km (28.0 mi) southwest of La Ronge, Saskatchewan coincide with the point (at 3244.1 meters AGL) at 10:00 EST on July 28 of the 100-meter release height back trajectory from Toledo and the 3250-meter release height forward trajectory from those wildfires at 10:00 EST on July 28 reaches Toledo (at 64.6 meters AGL) at 10:00 EST on July 31. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning southwest of La Ronge, Saskatchewan caused the high PM_{2.5} concentrations in Lucas County on July 31, 2025. The accompanying imagery map for July 31 presented in Figure 129 shows visible wildfire smoke and high AOD values stretching across the Great Lakes region, including Southeast Michigan, while the wildfire smoke over Ohio and Indiana is largely not captured due to heavy cloud cover. The visible wildfire smoke and high AOD values, particular over nearby areas in Southeast Michigan, provide further evidence that smoke from the Canadian wildfires was present in Lucas County on July 31, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 127. HYSPLIT 72-hour back trajectory plot from July 31, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 28, 2025.

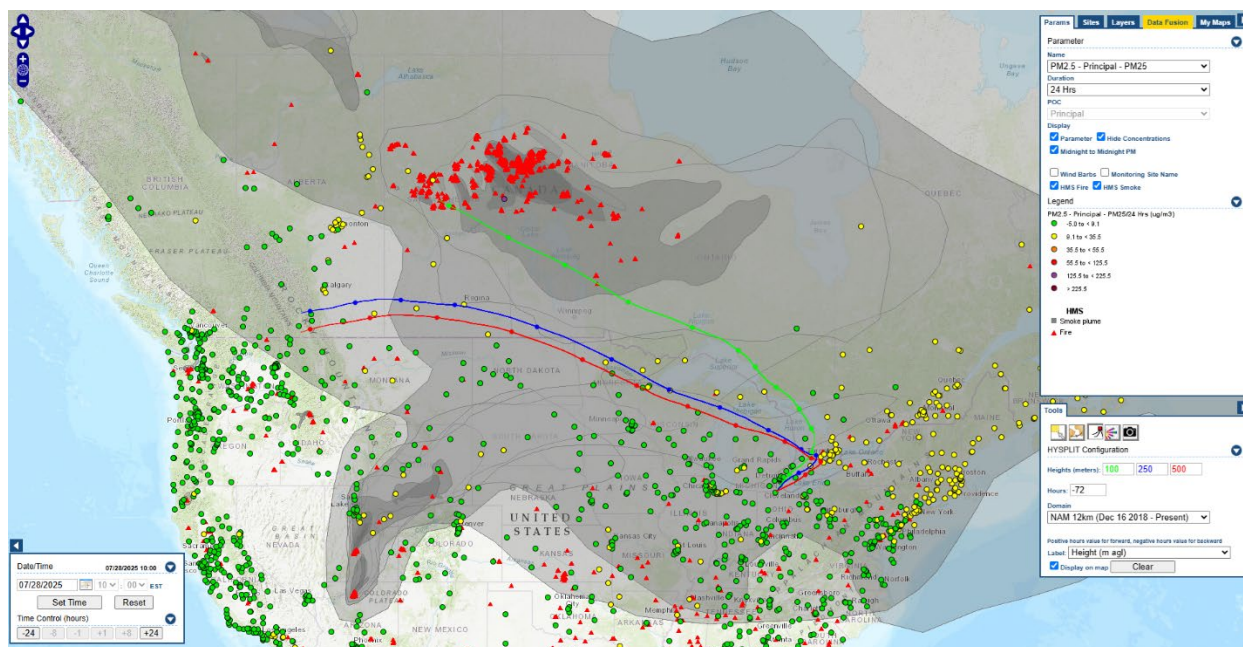


Figure 128. HYSPLIT 72-hour forward trajectory plot from July 28, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 31, 2025.

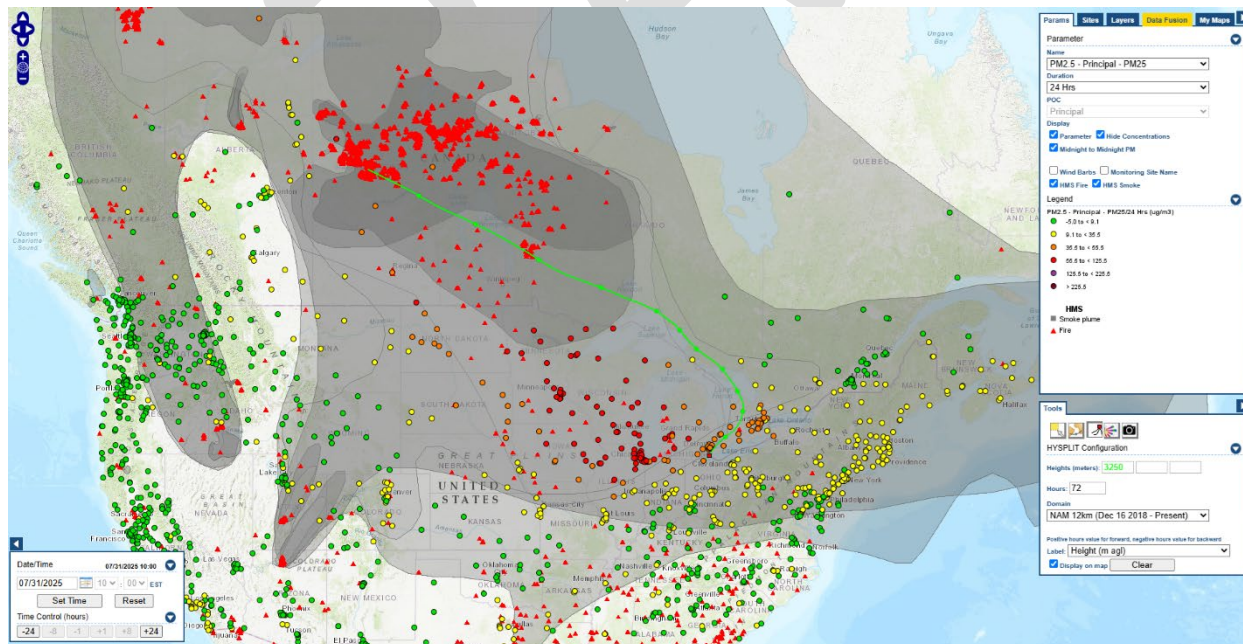


Figure 129. Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 31, 2025, showing visible wildfire smoke and high AOD values across the Great Lakes region, including Southeast Michigan, while the wildfire smoke over Ohio and Indiana is largely not captured due to heavy cloud cover.

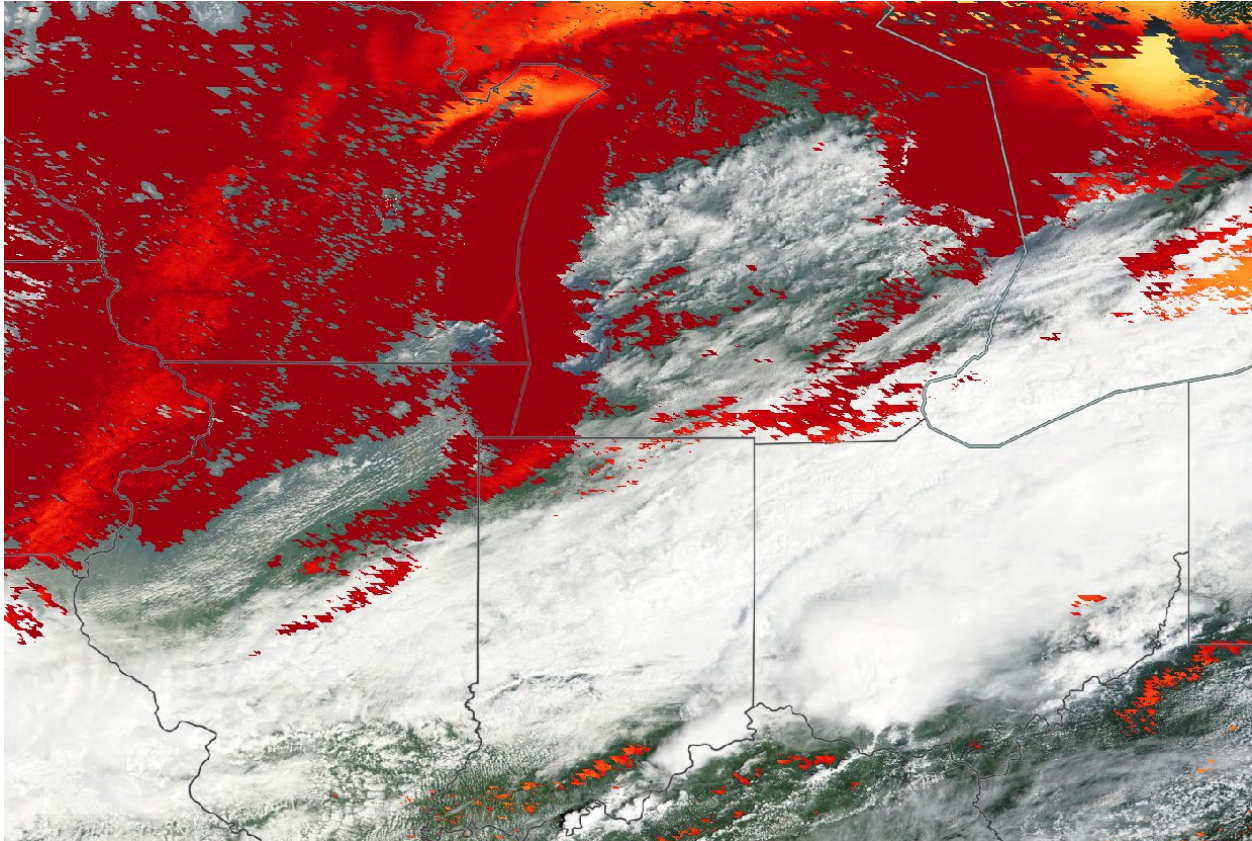


Table 17 and Figure 130 show the hourly average $PM_{2.5}$ concentrations on July 30-31, 2025, and the 2024-2025 average July concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations sharply increased at 21:00 EST on July 30 as wildfire smoke reached Toledo, remaining elevated throughout the entire day on July 31 and peaking at 55.3 $\mu g/m^3$ at 21:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on July 31, 2025.

Table 17. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 30-31, 2025, and 2024-2025 average July concentration data.

Hour of Day	2024-2025 Average July Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 30, 2025	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 31, 2025
00:00	13.7	15.1	35.2
01:00	14.3	14.6	32.6
02:00	14.7	14.0	48.9
03:00	13.7	14.5	48.6
04:00	13.7	14.3	29.7
05:00	15.0	14.7	26.2
06:00	15.1	17.0	20.2
07:00	15.1	17.6	10.3
08:00	13.8	12.8	21.5
09:00	13.9	12.1	28.6
10:00	13.7	12.4	26.8
11:00	13.5	12.8	30.8
12:00	13.5	12.4	28.8
13:00	12.7	12.6	27.1
14:00	12.6	12.8	31.9
15:00	12.3	13.9	39.8
16:00	12.1	12.8	40.0
17:00	11.9	10.9	41.3
18:00	12.0	10.6	47.7
19:00	12.1	14.4	52.3
20:00	12.3	18.7	54.7
21:00	13.3	37.6	55.3
22:00	14.4	42.3	53.1
23:00	13.9	39.0	43.6

Figure 130. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on July 30-31, 2025, and 2024-2025 average July concentrations.

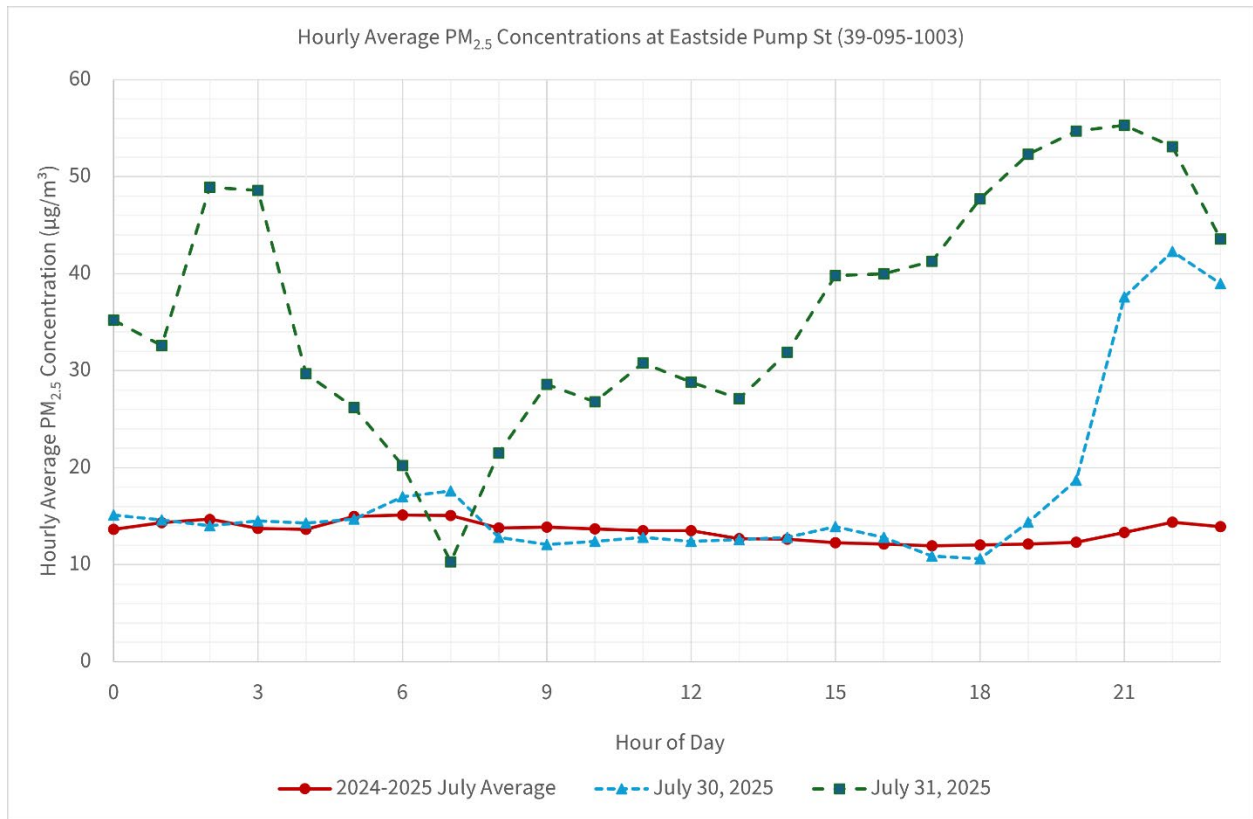
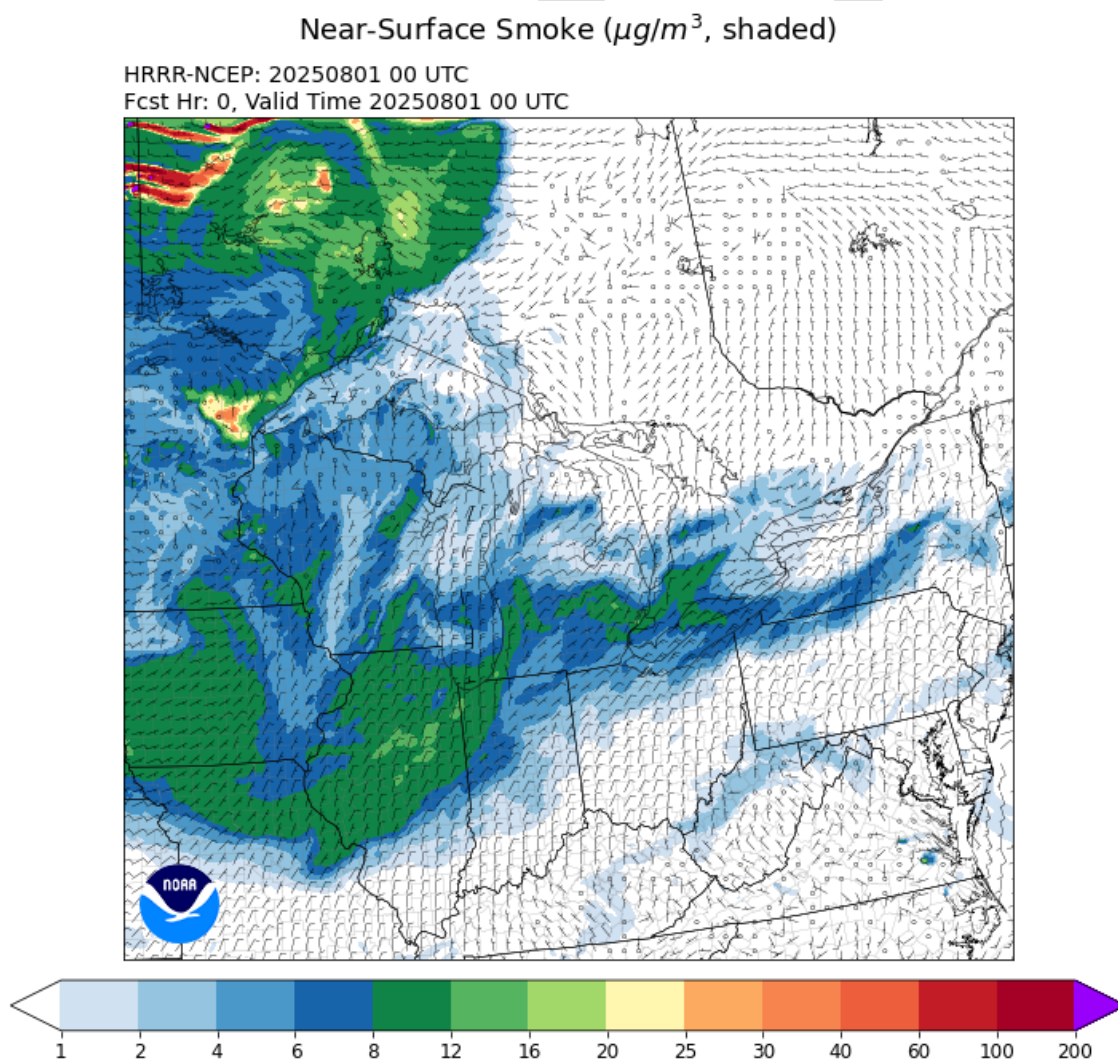


Figure 131 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 00Z on August 1, 2025 (19:00 EST on July 31, 2025). The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $6 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on July 31, 2025.

Figure 131. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 00Z on August 1, 2025 (19:00 EST on July 31, 2025).



3.6.2. August 1, 2025

The HYSPLIT 72-hour back and 64-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on August 1, 2025. Figure 132 shows the HYSPLIT 72-hour back trajectory plot for August 1, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 29. Figure 133 shows the HYSPLIT 64-hour forward trajectory plot for July 29, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 1. The wildfires burning 36 km (22.4 mi) north of Garden Hill, Manitoba coincide with the point (at 1897.5 meters AGL) at 09:00 EST on July 29 of the 250-meter release height back trajectory from Toledo and the 1900-meter release height forward trajectory from those wildfires at 09:00 EST on July 29 reaches Toledo (at 178.6 meters AGL) at 01:00 EST on August 1. The coincidence of the 72-hour back and 64-hour forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning north of Garden Hill, Manitoba caused the high PM_{2.5} concentrations in Lucas County on August 1, 2025. The accompanying imagery map for August 1 presented in Figure 134 shows visible wildfire smoke over Northwestern Ohio, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on August 1, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 132. HYSPLIT 72-hour back trajectory plot from 01:00 EST on August 1, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for 09:00 EST on July 29, 2025.

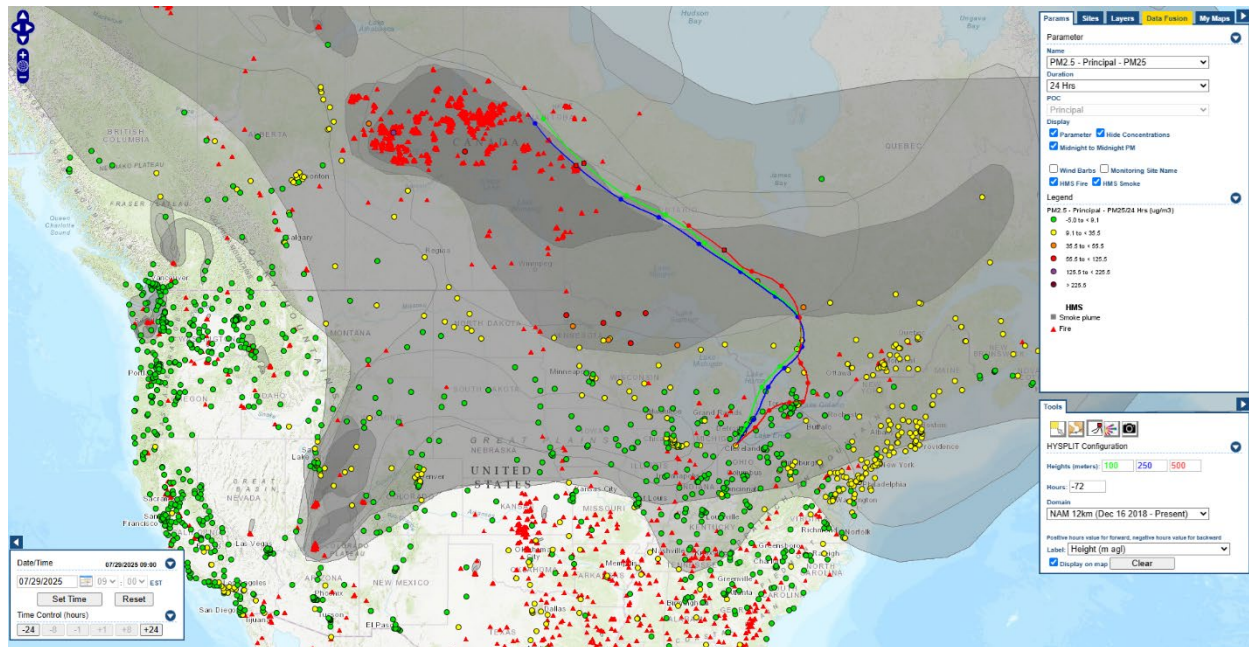


Figure 133. HYSPLIT 64-hour forward trajectory plot from 09:00 EST on July 29, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for 01:00 EST on August 1, 2025.

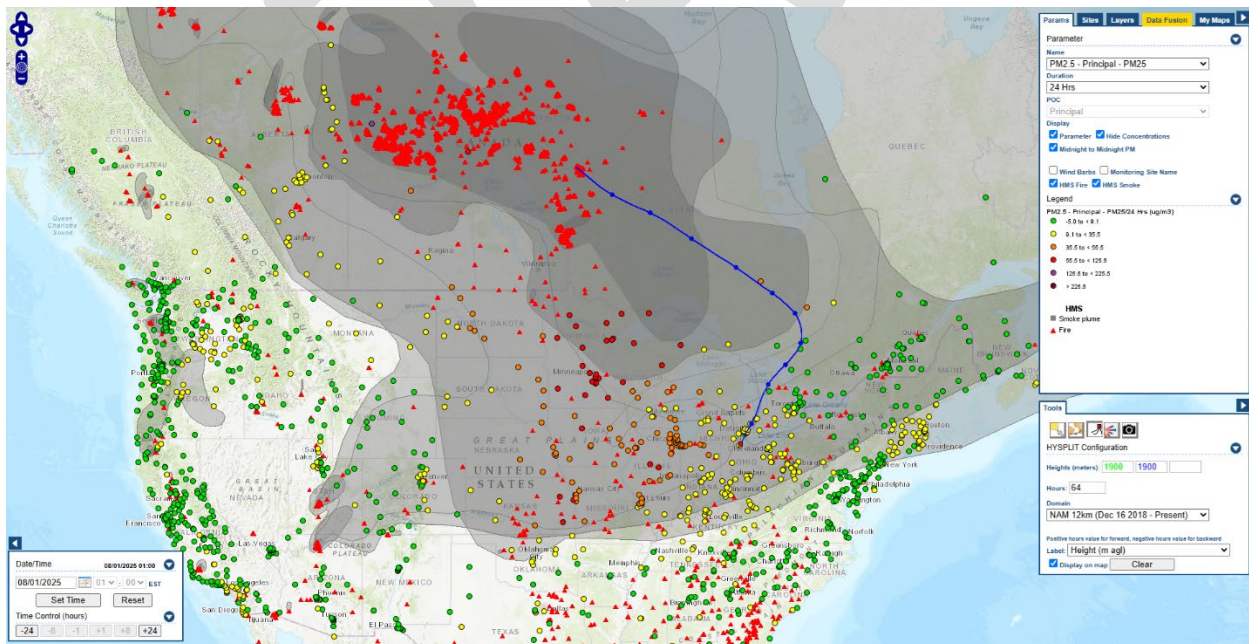


Figure 134. Terra satellite true color imagery of Ohio and surrounding states for August 1, 2025, showing visible wildfire smoke over Northwestern Ohio, including Lucas County.

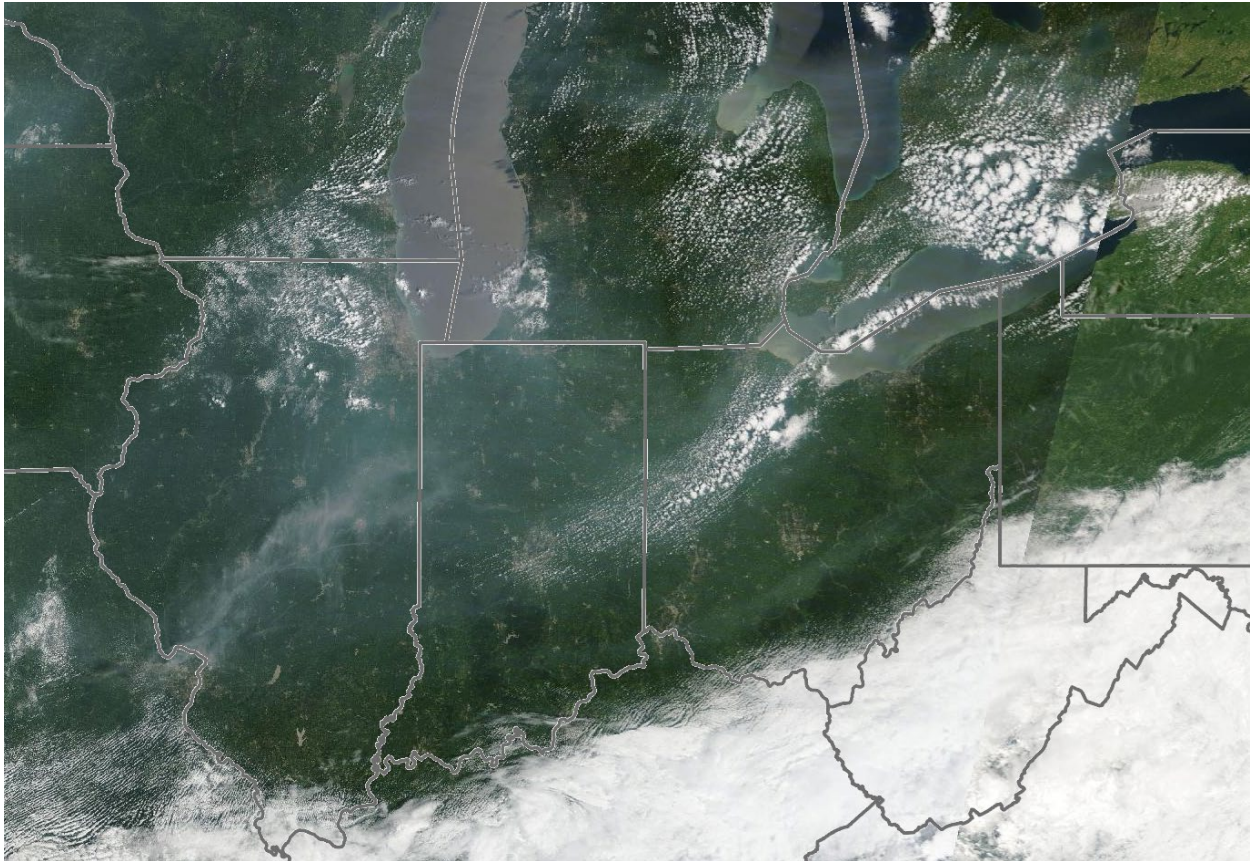


Table 18 and Figure 135 show the hourly average $PM_{2.5}$ concentrations on August 1, 2025, and the 2024-2025 average August concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations remained elevated due to lingering wildfire smoke until 18:00 EST on August 1, when a front pushed out the remaining wildfire smoke near the surface, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on August 1, 2025.

Table 18. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 1, 2025, and 2024-2025 average August concentration data.

Hour of Day	2024-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on August 1, 2025
00:00	12.0	43.2
01:00	12.7	42.9
02:00	12.8	43.4
03:00	12.8	42.9
04:00	13.4	42.8
05:00	14.1	41.7
06:00	14.9	40.6
07:00	15.5	33.0
08:00	15.0	23.9
09:00	13.9	14.6
10:00	14.2	15.5
11:00	13.8	20.6
12:00	13.6	27.8
13:00	13.0	33.8
14:00	13.3	32.4
15:00	12.2	29.9
16:00	11.6	28.2
17:00	11.2	19.7
18:00	10.6	10.4
19:00	10.8	8.1
20:00	11.1	7.8
21:00	11.4	7.8
22:00	11.4	7.3
23:00	11.6	7.1

Figure 135. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 1, 2025, and 2024-2025 average August concentrations.

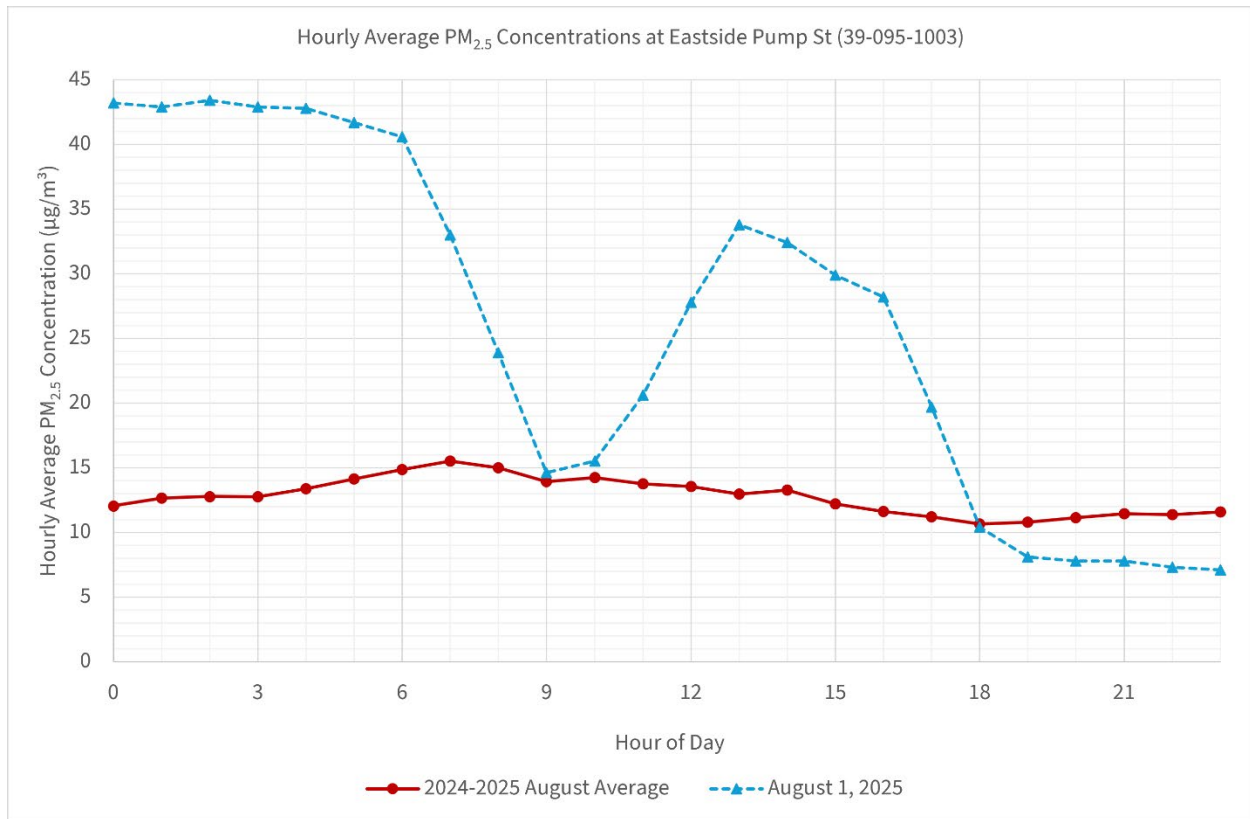
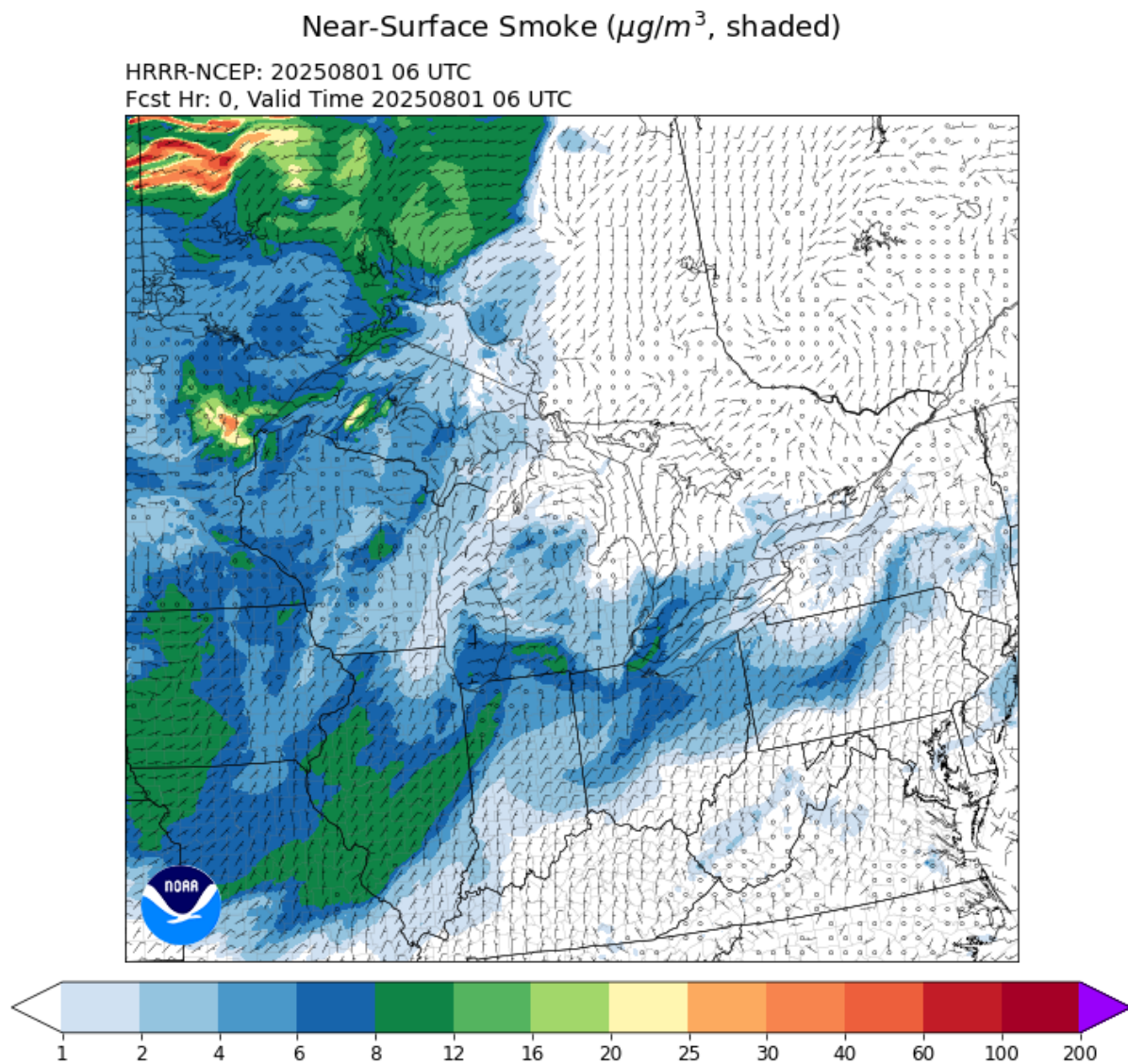


Figure 136 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 1, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $8 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on August 1, 2025.

Figure 136. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 1, 2025.



3.7. Wildfire Smoke-Driven PM_{2.5} Episode from August 4-5, 2025

3.7.1. August 4, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on August 4, 2025. Figure 137 shows the HYSPLIT 72-hour back trajectory plot for August 4, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 1. Figure 138 shows the HYSPLIT 72-hour forward trajectory plot for August 1, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 4. The wildfires burning 105 km (65.2 mi) northeast of Bloodvein, Manitoba coincide with the point (at 1870.9 meters AGL) at 07:00 EST on July 29 of the 250-meter release height back trajectory from Toledo and the 1900-meter release height forward trajectory from those wildfires at 07:00 EST on July 29 reaches Toledo (at 218.9 meters AGL) at 07:00 EST on August 4. The coincidence of the 72-hour back and forward trajectories between the wildfire location and Toledo serves as clear evidence that the smoke from the wildfires burning northeast of Bloodvein, Manitoba caused the high PM_{2.5} concentrations in Lucas County on August 4, 2025. The accompanying imagery map for August 4 presented in Figure 139 shows visible wildfire smoke across the Great Lakes region, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on August 4, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 137. HYSPLIT 72-hour back trajectory plot from August 4, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 1, 2025.

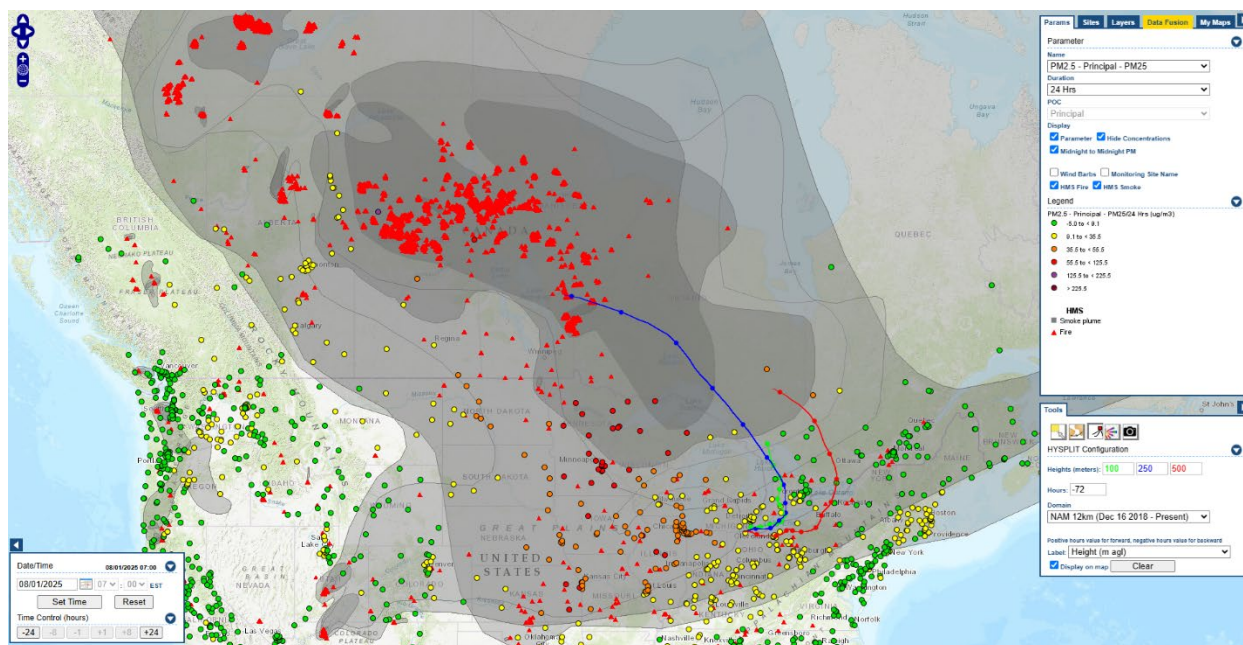


Figure 138. HYSPLIT 72-hour forward trajectory plot from August 1, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 4, 2025.

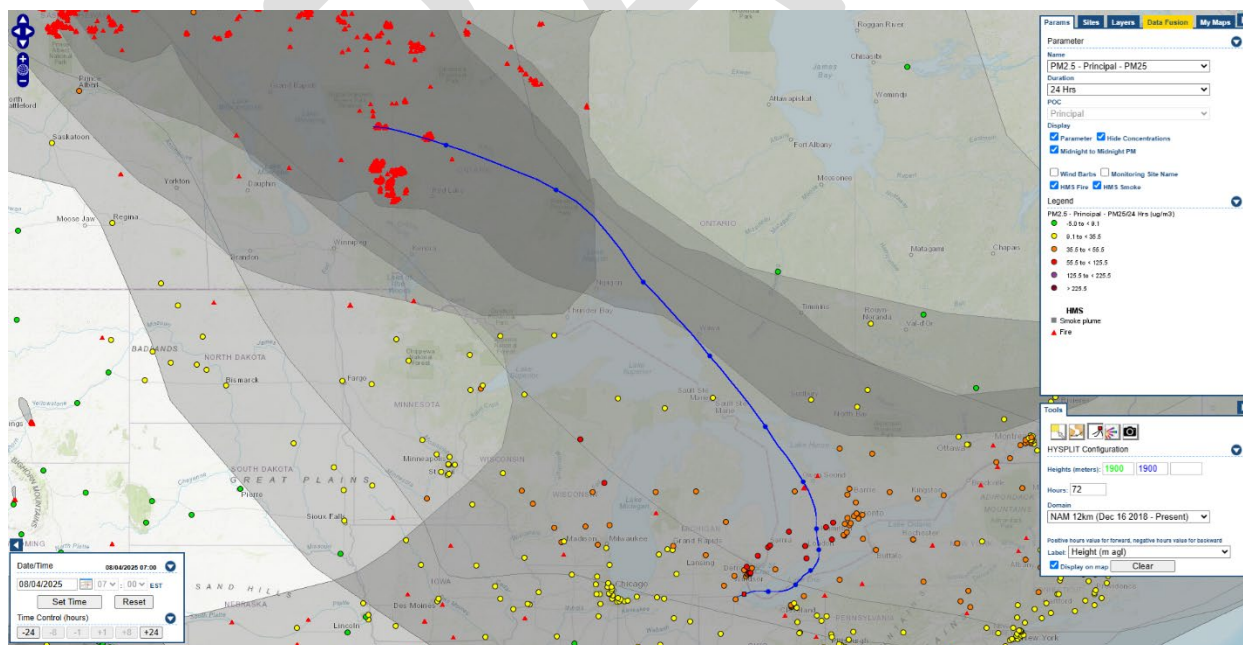


Figure 139. Terra satellite true color imagery of Ohio and surrounding states for August 4, 2025, showing visible wildfire smoke across the Great Lakes region, including Lucas County.

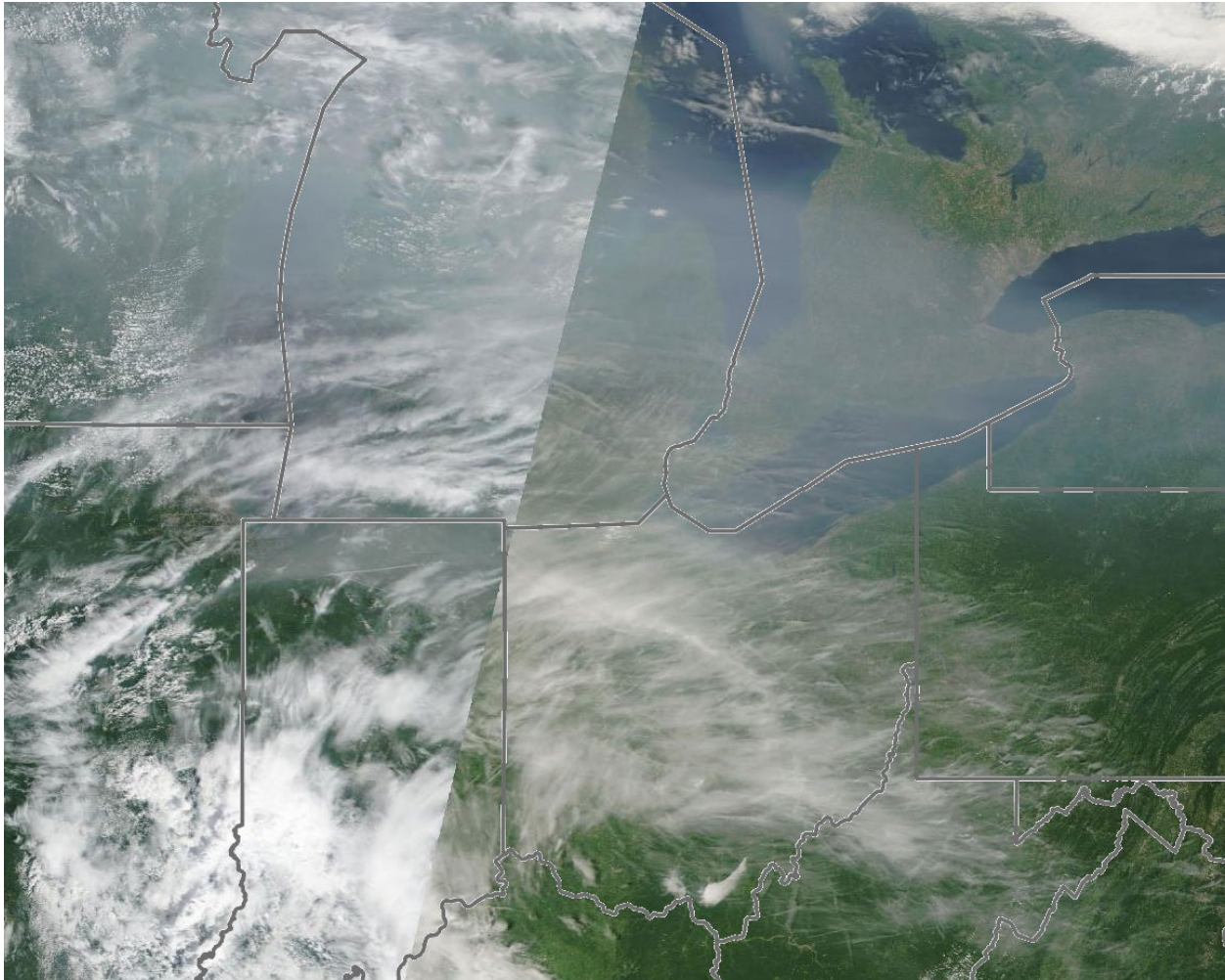


Table 19 and Figure 140 show the hourly average $PM_{2.5}$ concentrations on August 4, 2025, and the 2024-2025 average August concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations were already elevated in the early morning but steadily increased through the morning and early afternoon, remaining elevated throughout the rest of the day on August 4, peaking at $59.0 \mu g/m^3$ at 14:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on August 4, 2025.

Table 19. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 4, 2025, and 2024-2025 average August concentration data.

Hour of Day	2024-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on August 4, 2025
00:00	12.0	24.1
01:00	12.7	24.1
02:00	12.8	26.4
03:00	12.8	29.3
04:00	13.4	31.2
05:00	14.1	32.1
06:00	14.9	36.1
07:00	15.5	37.6
08:00	15.0	40.2
09:00	13.9	N/A (Null Code AZ; Quality Control Audit)
10:00	14.2	49.5
11:00	13.8	48.4
12:00	13.6	53.5
13:00	13.0	55.9
14:00	13.3	59.0
15:00	12.2	56.2
16:00	11.6	50.1
17:00	11.2	46.4
18:00	10.6	41.2
19:00	10.8	42.2
20:00	11.1	44.8
21:00	11.4	43.3
22:00	11.4	42.1
23:00	11.6	40.1

Figure 140. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 4, 2025, and 2024-2025 average August concentrations.

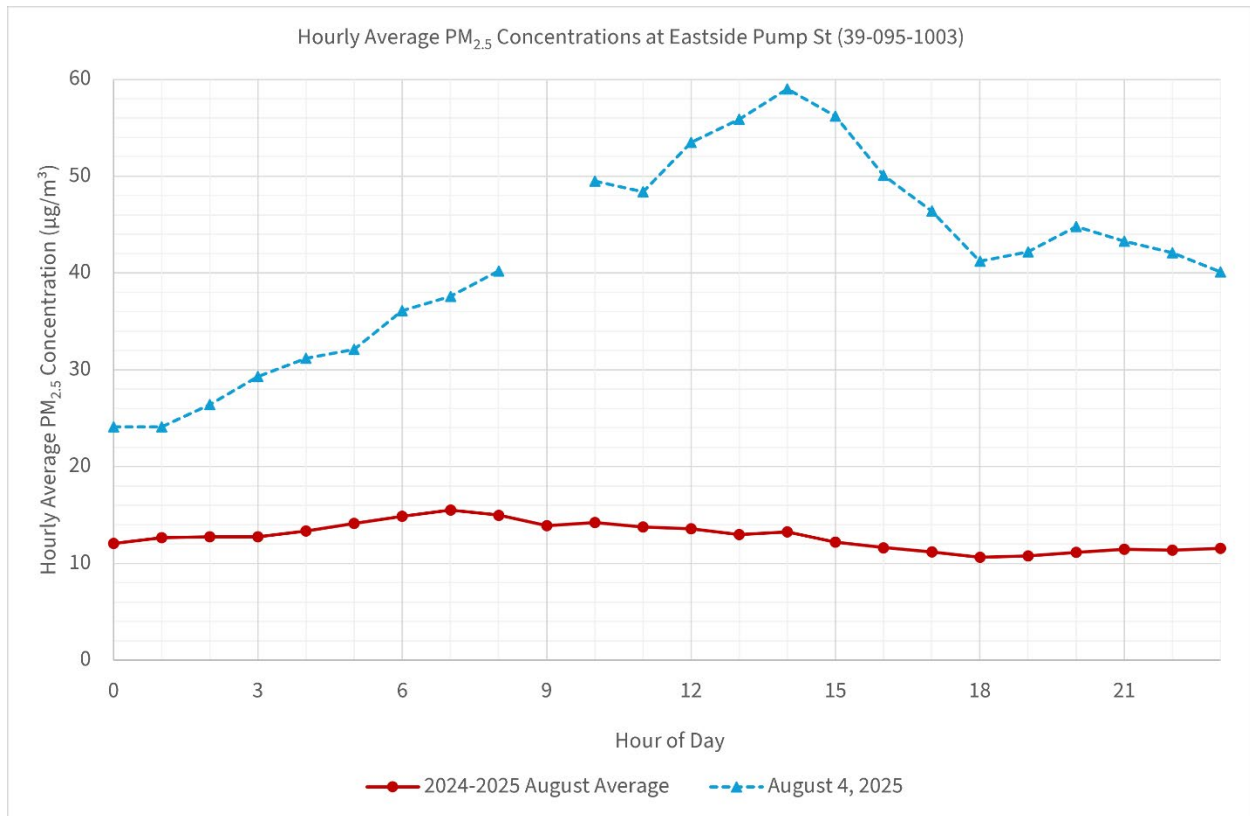
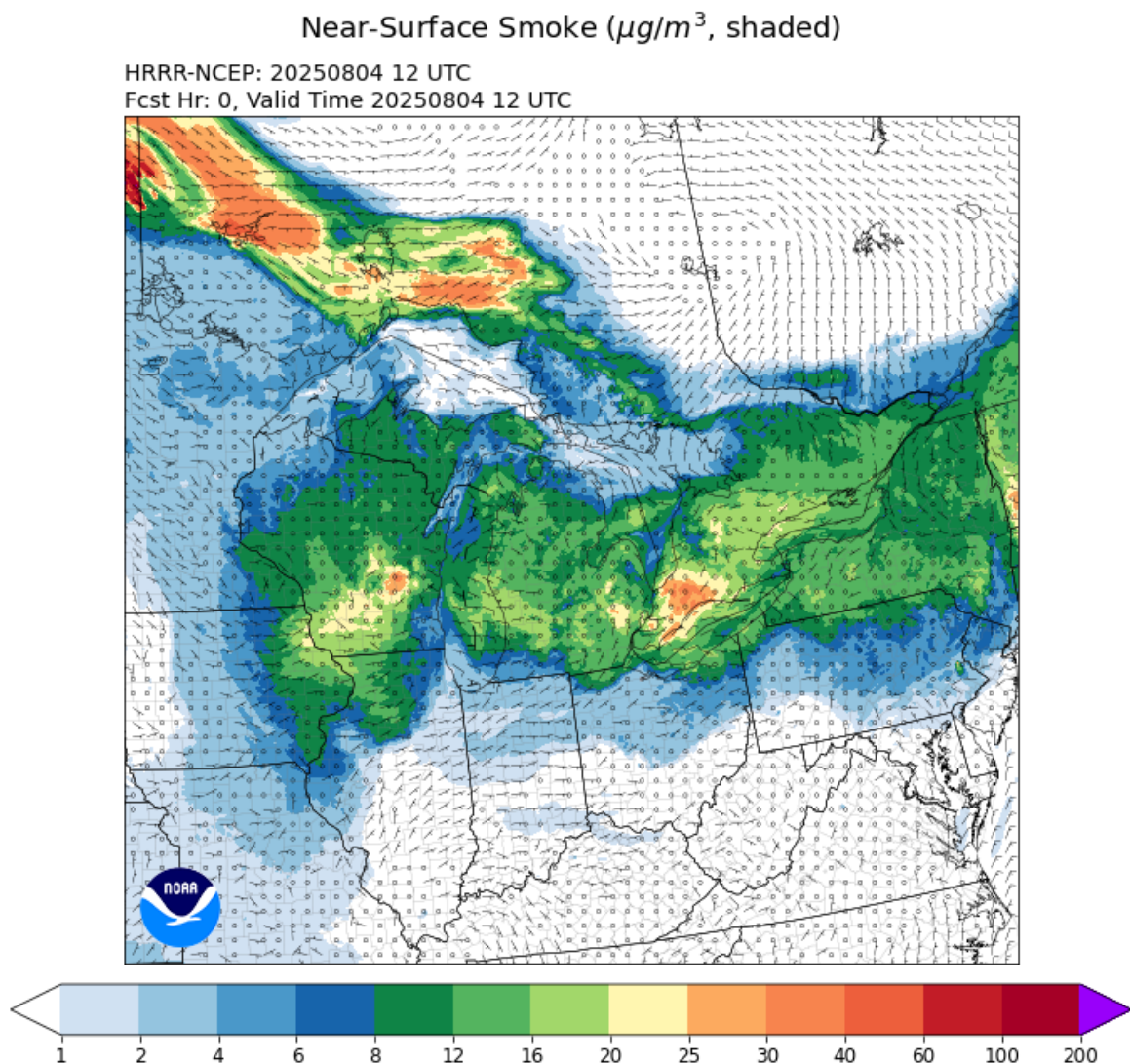


Figure 141 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on August 4, 2025. The HRRR model initialization showed near-surface smoke across Northern Ohio, including near-surface smoke concentrations of approximately $12 \mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Eastside Pump St monitoring site on August 4, 2025.

Figure 141. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on August 4, 2025.



3.7.2. August 5, 2025

The HYSPLIT 120-hour back trajectory plot show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Lucas County on August 5, 2025. Figure 142 shows the HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site, released at a height of 69.0 m AGL at 00:00 EST on August 5, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. Figure 143 shows the July 31 portion of the back trajectory plot with smoke plumes and wildfire locations overlaid on the map. A heavily wildfire smoke-impacted location 40 km (24.9 mi) northeast of the wildfires burning 75 km (46.6 mi) east of Bloodvein, Manitoba coincides with the point (at 2115.8 m AGL) at 11:00 EST on July 31 of the 120-hour back trajectory from the Eastside Pump St monitoring site in Lucas County, illustrating the transport of this wildfire smoke to Northwestern Ohio and serving as clear evidence that the smoke from the wildfires burning east of Bloodvein, Manitoba ultimately caused the high PM_{2.5} concentrations in Lucas County on August 5, 2025. The accompanying imagery map for August 5 presented in Figure 144 shows visible wildfire smoke with moderate and high AOD values across the Great Lakes region, including Lucas County, providing further evidence that smoke from the Canadian wildfires was present in Lucas County on August 5, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Lucas County.

Figure 142. HYSPLIT 120-hour back trajectory plot from the Eastside Pump St monitoring site in Lucas County at 00:00 EST on August 5, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.

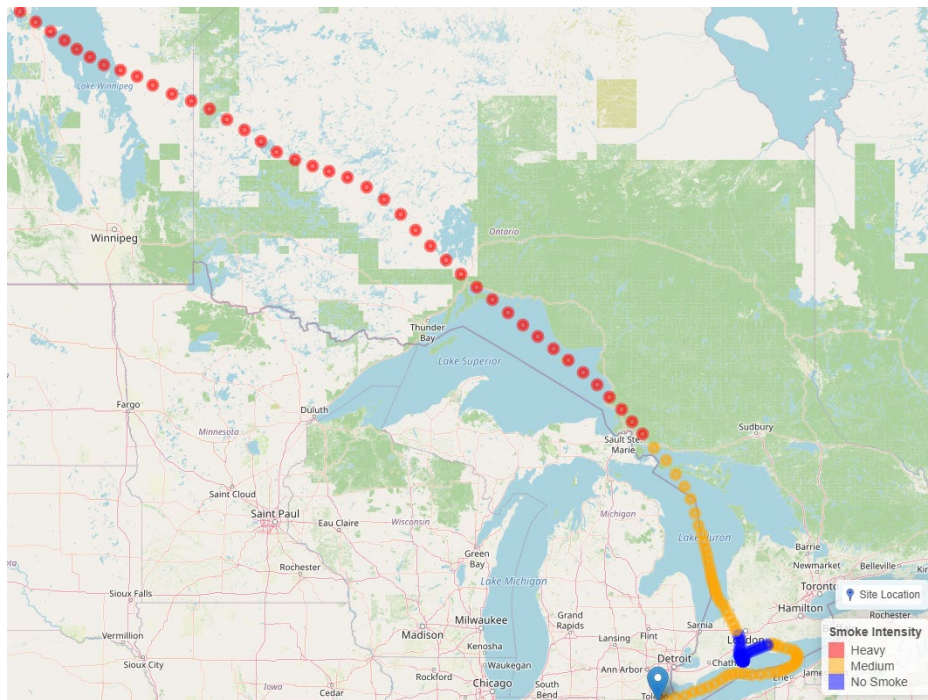


Figure 143. The July 31 portion of the HYSPLIT 120-hour back trajectory plot from the Eastside Pump St (39-095-1003) monitoring site in Lucas County, with overlaid smoke plumes and wildfire locations.

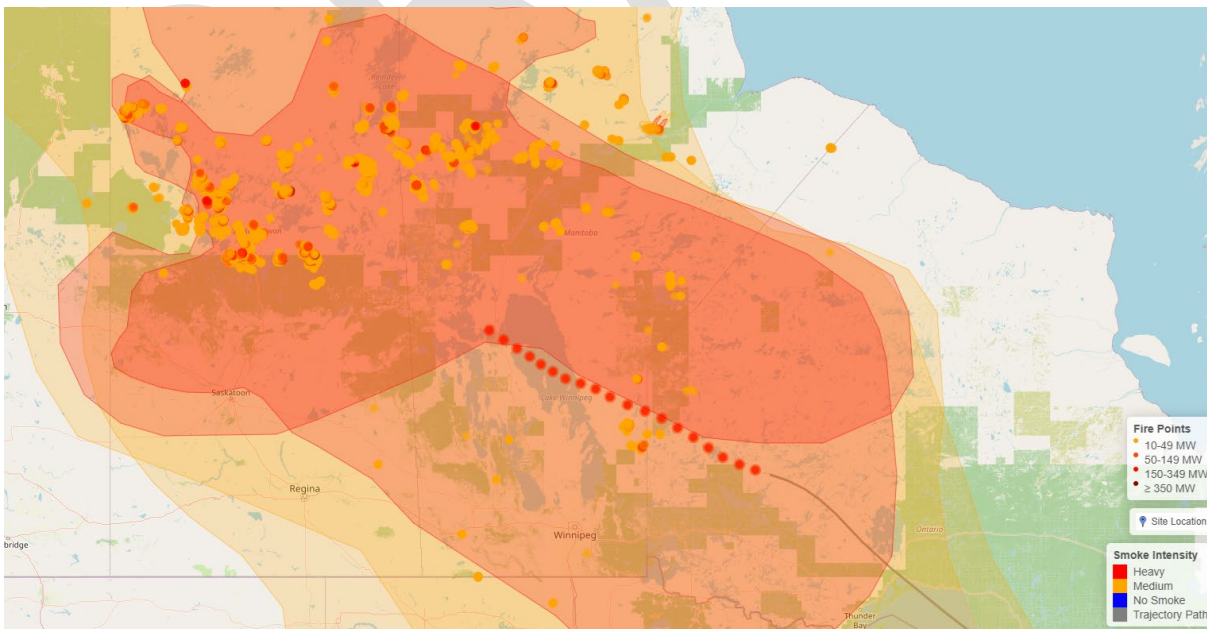


Figure 144. Aqua satellite true color and MAIAC AOD imagery of Ohio and surrounding states for August 5, 2025, showing visible wildfire smoke with moderate and high AOD values across the Great Lakes region, including Lucas County.

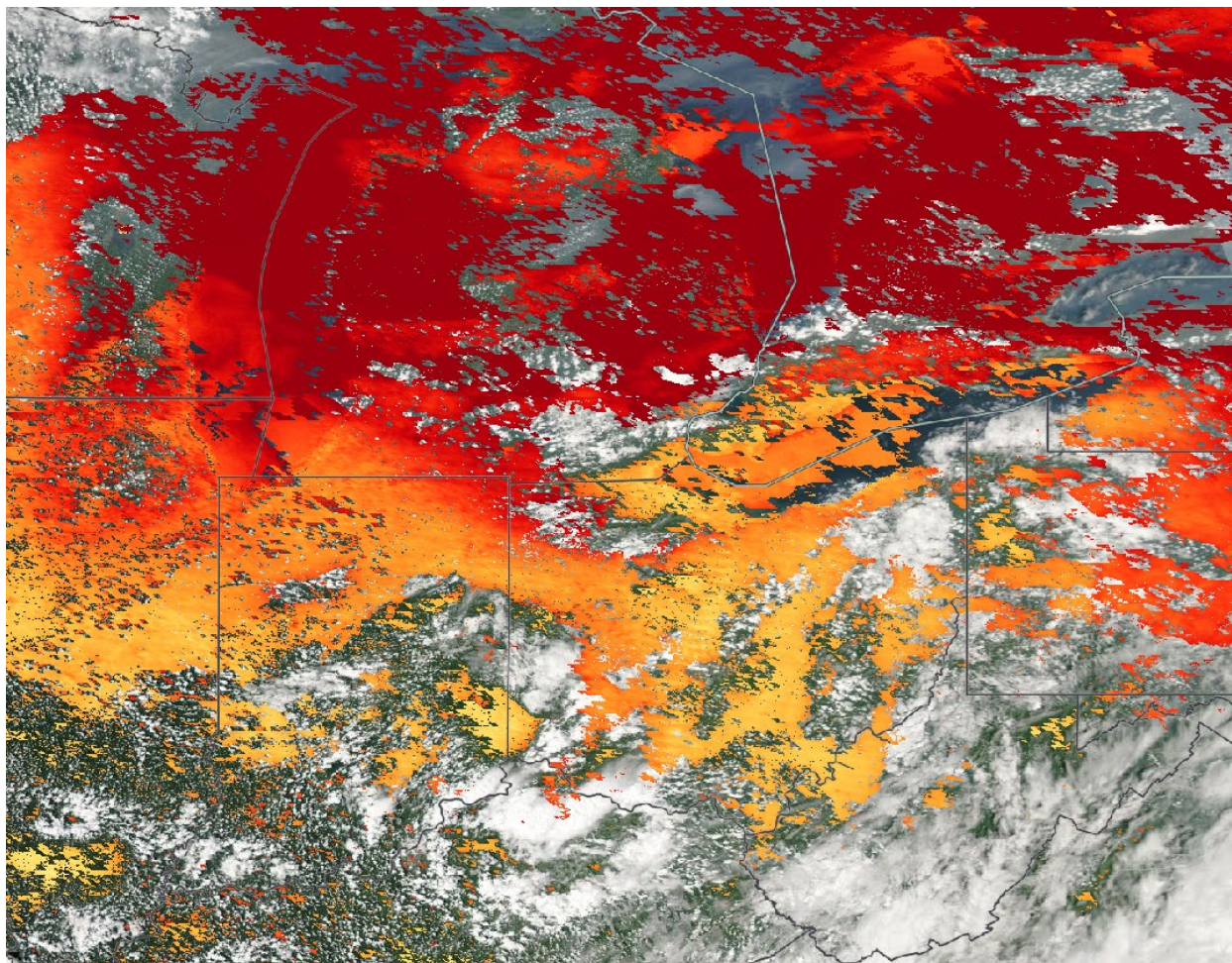


Table 20 and Figure 145 show the hourly average $PM_{2.5}$ concentrations on August 5, 2025, and the 2024-2025 average August concentrations measured by the POC3 Teledyne T640 monitor at the Eastside Pump St (39-095-1003) monitoring site in Lucas County. The hourly average $PM_{2.5}$ concentrations remained elevated throughout the day on August 5, although decreasing to less elevated concentrations by 13:00 EST, peaking at $65.5 \mu\text{g}/\text{m}^3$ at 03:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Lucas County on August 5, 2025.

Table 20. Hourly average PM_{2.5} concentration data from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 5, 2025, and 2024-2025 average August concentration data.

Hour of Day	2024-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on August 5, 2025
00:00	12.0	42.6
01:00	12.7	55.7
02:00	12.8	64.4
03:00	12.8	65.5
04:00	13.4	60.1
05:00	14.1	55.3
06:00	14.9	50.6
07:00	15.5	46.7
08:00	15.0	49.3
09:00	13.9	50.2
10:00	14.2	53.2
11:00	13.8	48.0
12:00	13.6	40.1
13:00	13.0	26.1
14:00	13.3	23.7
15:00	12.2	19.4
16:00	11.6	17.3
17:00	11.2	18.6
18:00	10.6	19.4
19:00	10.8	20.0
20:00	11.1	20.0
21:00	11.4	20.1
22:00	11.4	18.8
23:00	11.6	18.5

Figure 145. Plot of hourly average PM_{2.5} concentrations from the Eastside Pump St (39-095-1003) monitoring site in Lucas County on August 5, 2025, and 2024-2025 average August concentrations.

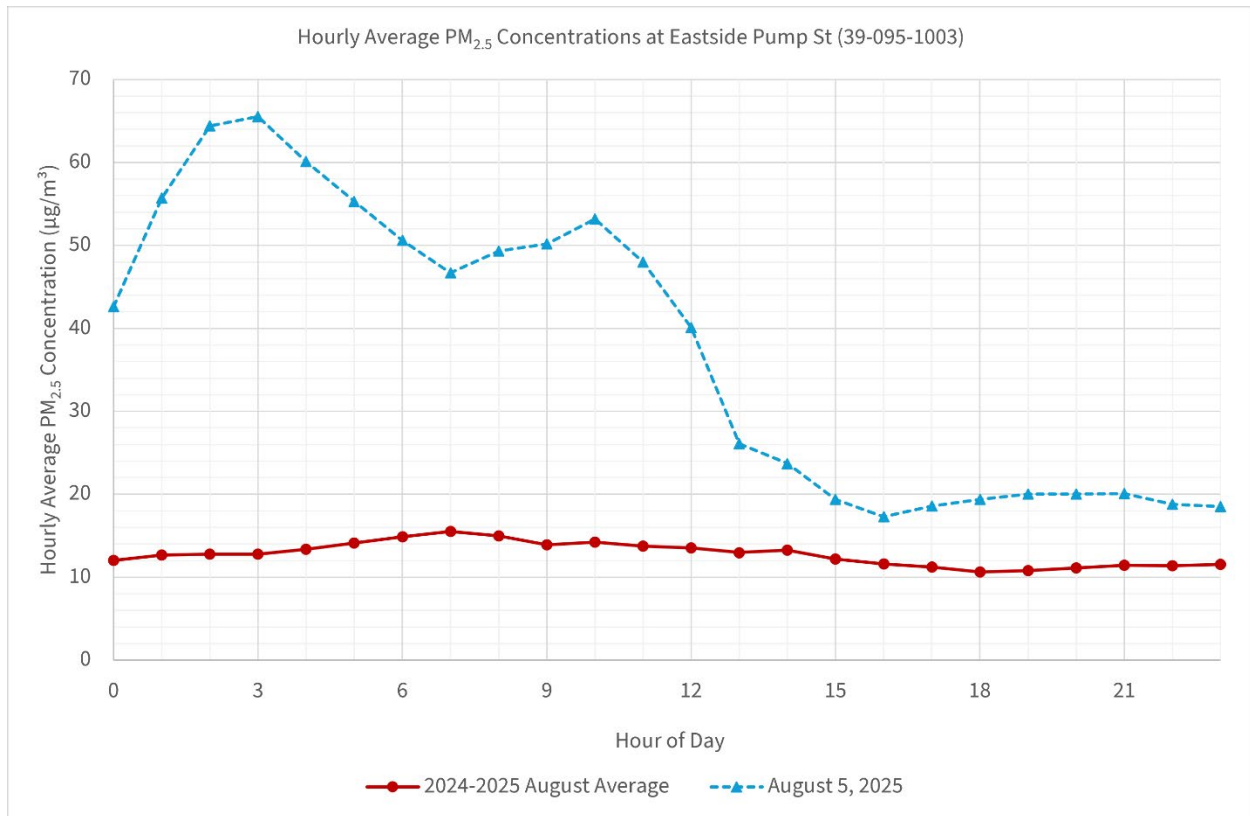
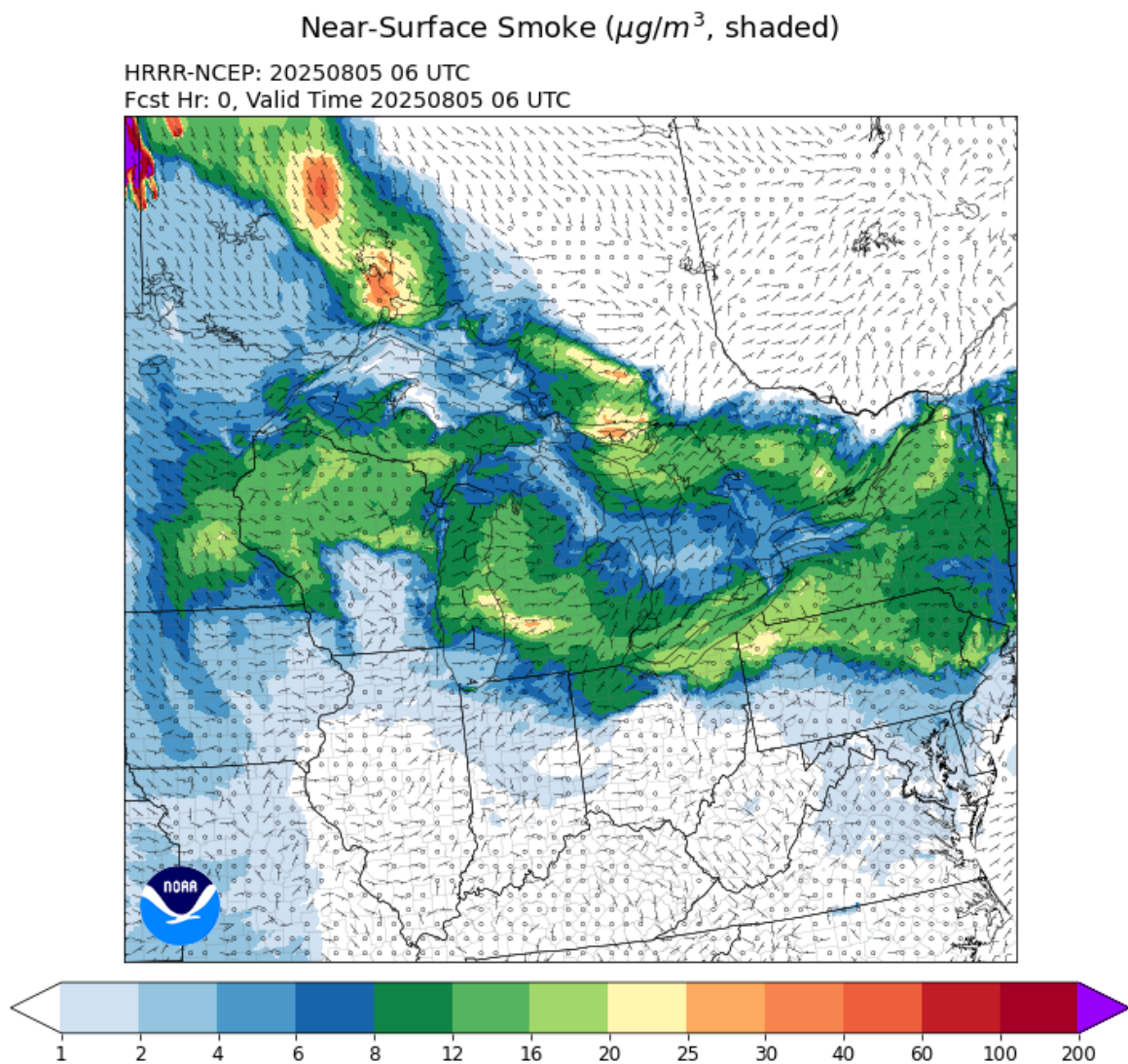


Figure 146 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 5, 2025. The HRRR model initialization showed near-surface smoke across Northern Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Eastside Pump St monitoring site in Lucas County, providing further evidence that wildfire smoke impacted PM_{2.5} concentrations at the Eastside Pump St monitoring site on August 5, 2025.

Figure 146. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 5, 2025.



4. Fireworks Display or Not Reasonably Controllable and Not Reasonably Preventable

40 CFR 50.14 (c)(3)(iv)(D) requires a demonstration that the event was both not reasonably controllable and not reasonably preventable, or that the event was a fireworks display consistent with 40 CFR 50.14(b)(2). It has been demonstrated that widespread Fourth of July holiday celebration-related fireworks displays generated smoke that impacted PM_{2.5} concentrations at the Eastside Pump St monitoring site in Lucas County on July 5, 2025. For wildfires, it is presumed according to 40 CFR 50.14(b)(4) that wildfires on wildland will satisfy both factors unless there is evidence that demonstrates otherwise. 40 CFR 50.1(n) defines a wildfire as “any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire”. 40 CFR 50.1(o) defines wildland as “an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered”. Figures 147 to 160 show satellite imagery of the wildland areas on which wildfires generated plumes of smoke that ultimately impacted Lucas County for each of the previously detailed wildfire-smoke driven PM_{2.5} episodes.

Figure 147. Satellite imagery of the wildland areas 105 km (65.2 mi) west-northwest of Baie-Comeau, Quebec, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 3, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 5, 2023.

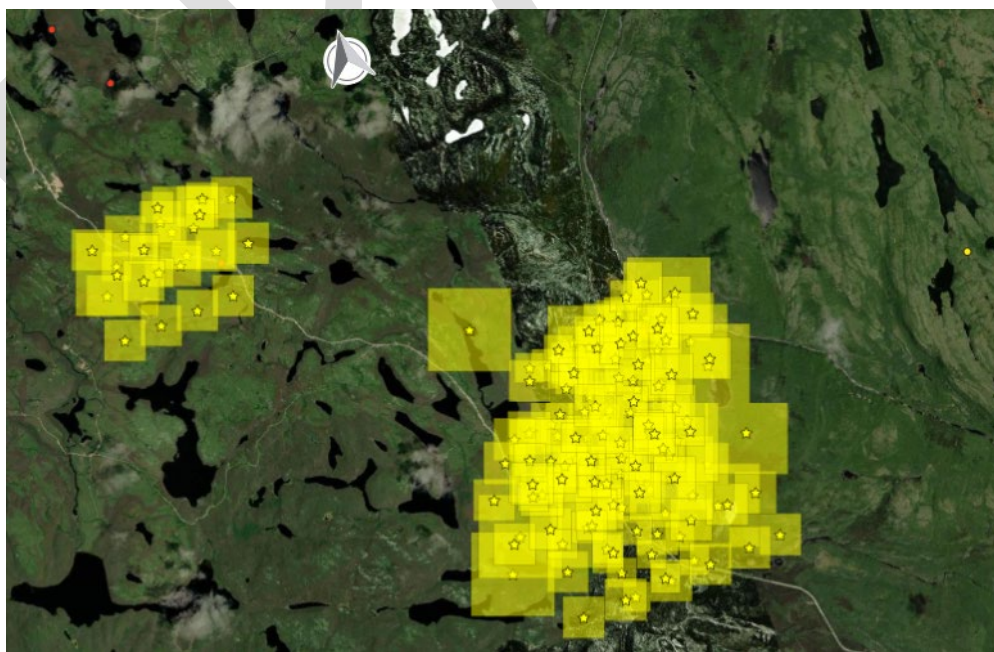


Figure 148. Satellite imagery of the wildland areas 200 km (124.3 mi) east of Wemindji, Quebec, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 15, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 17, 2023.

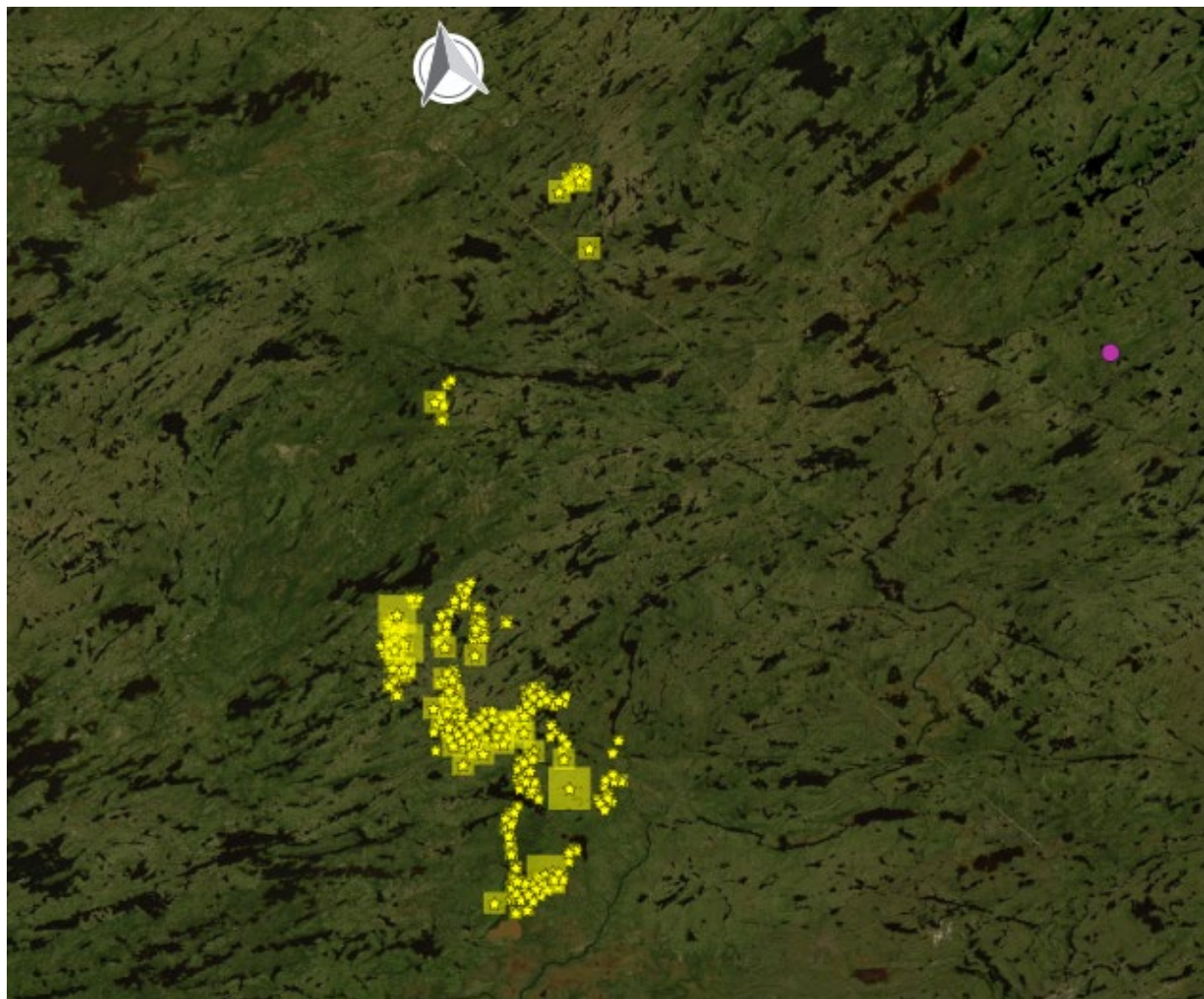


Figure 149. Satellite imagery of the wildland areas 175 km (108.7 mi) north of Red Lake, Ontario, with circles and stars/squares respectively marking the active wildfires and recent hotspots on May 31, 2025, that resulted in the wildfire smoke-driven $PM_{2.5}$ episode in Lucas County on June 3, 2025.

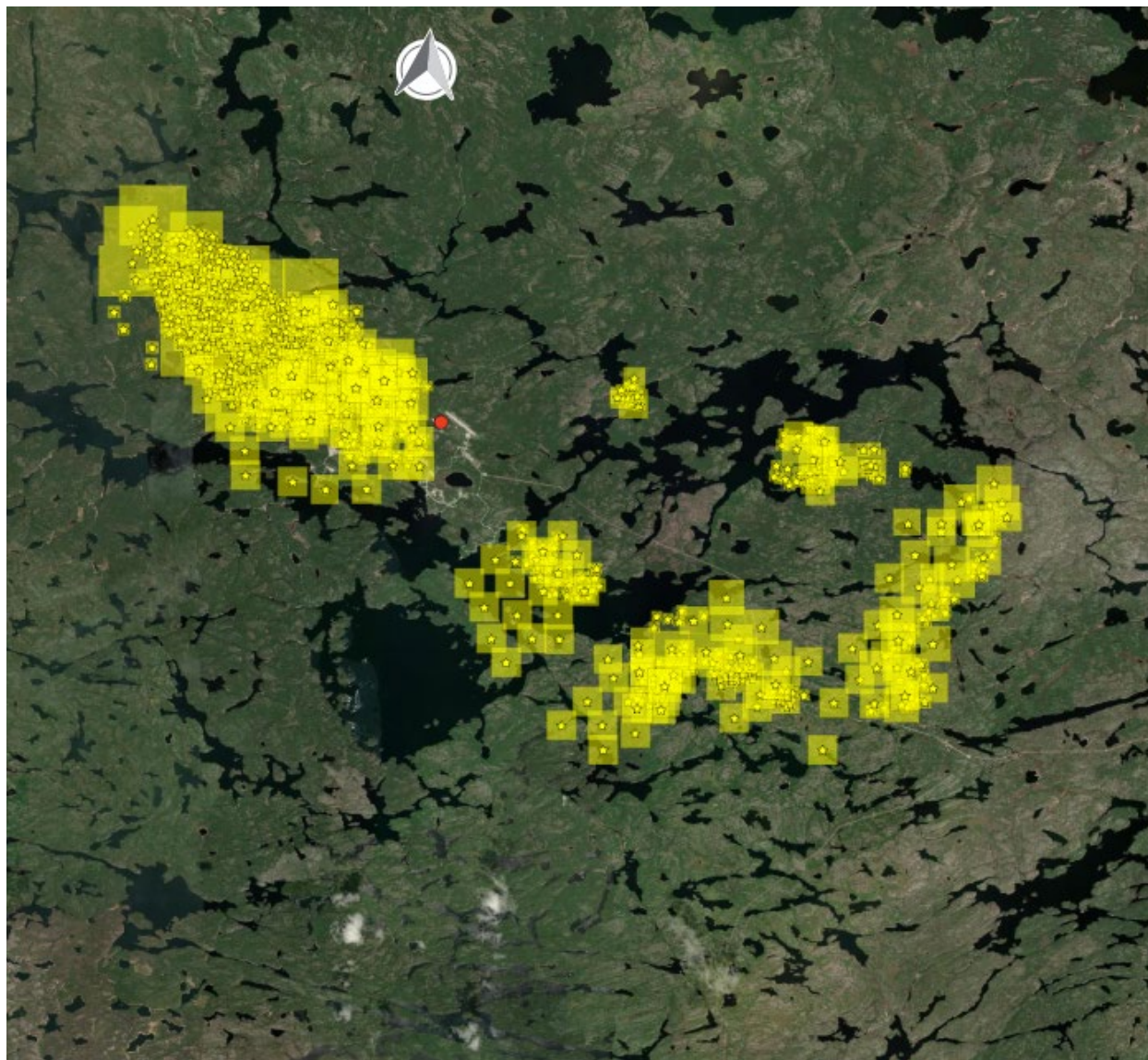


Figure 150. Satellite imagery of the wildland areas near Webequie, Ontario, with circles and stars/squares respectively marking the active wildfires and recent hotspots on May 30, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 4, 2025.

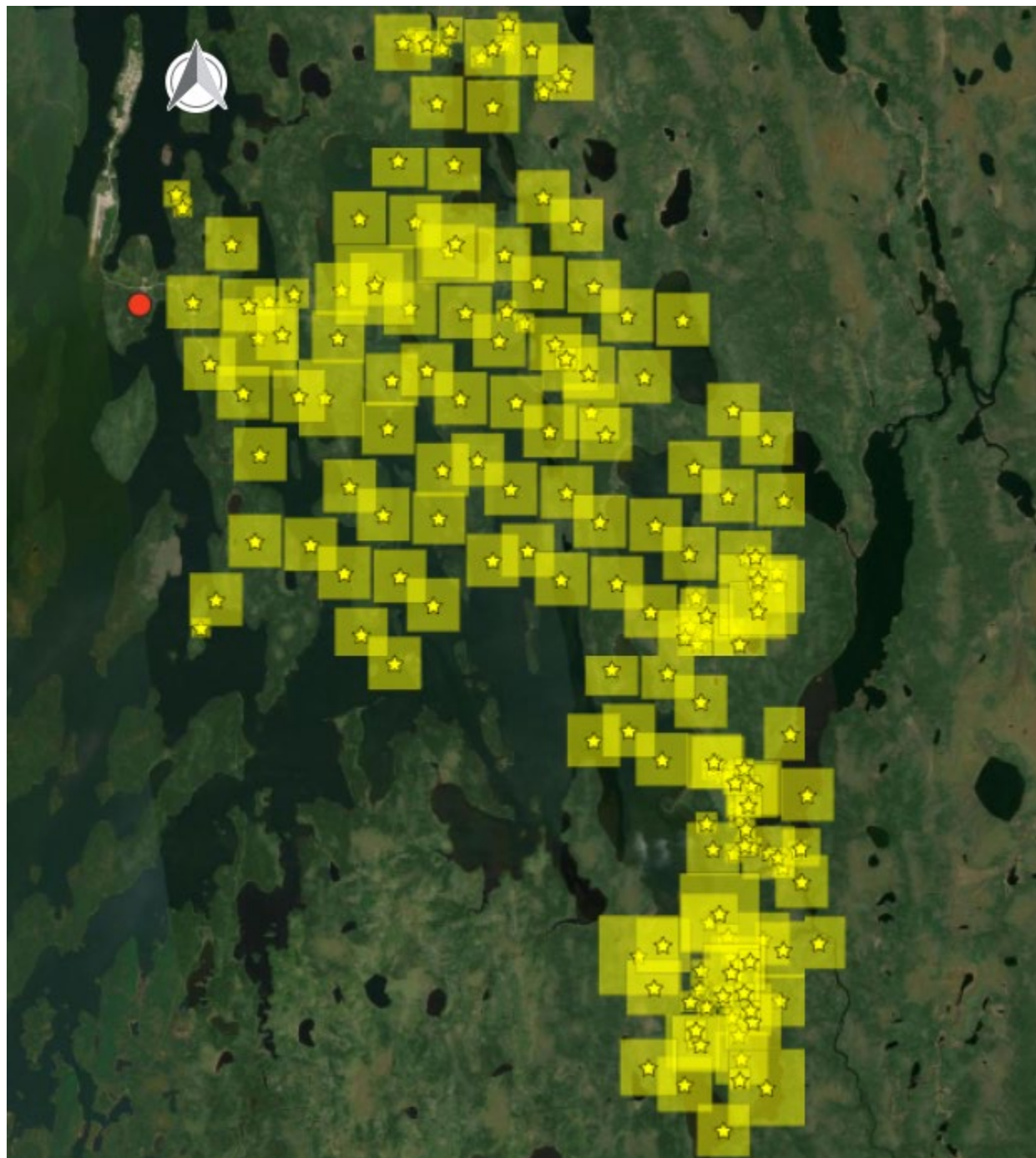


Figure 151. Satellite imagery of the wildland areas 16 km (9.9 mi) northwest of La Ronge, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 2, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 5, 2025.

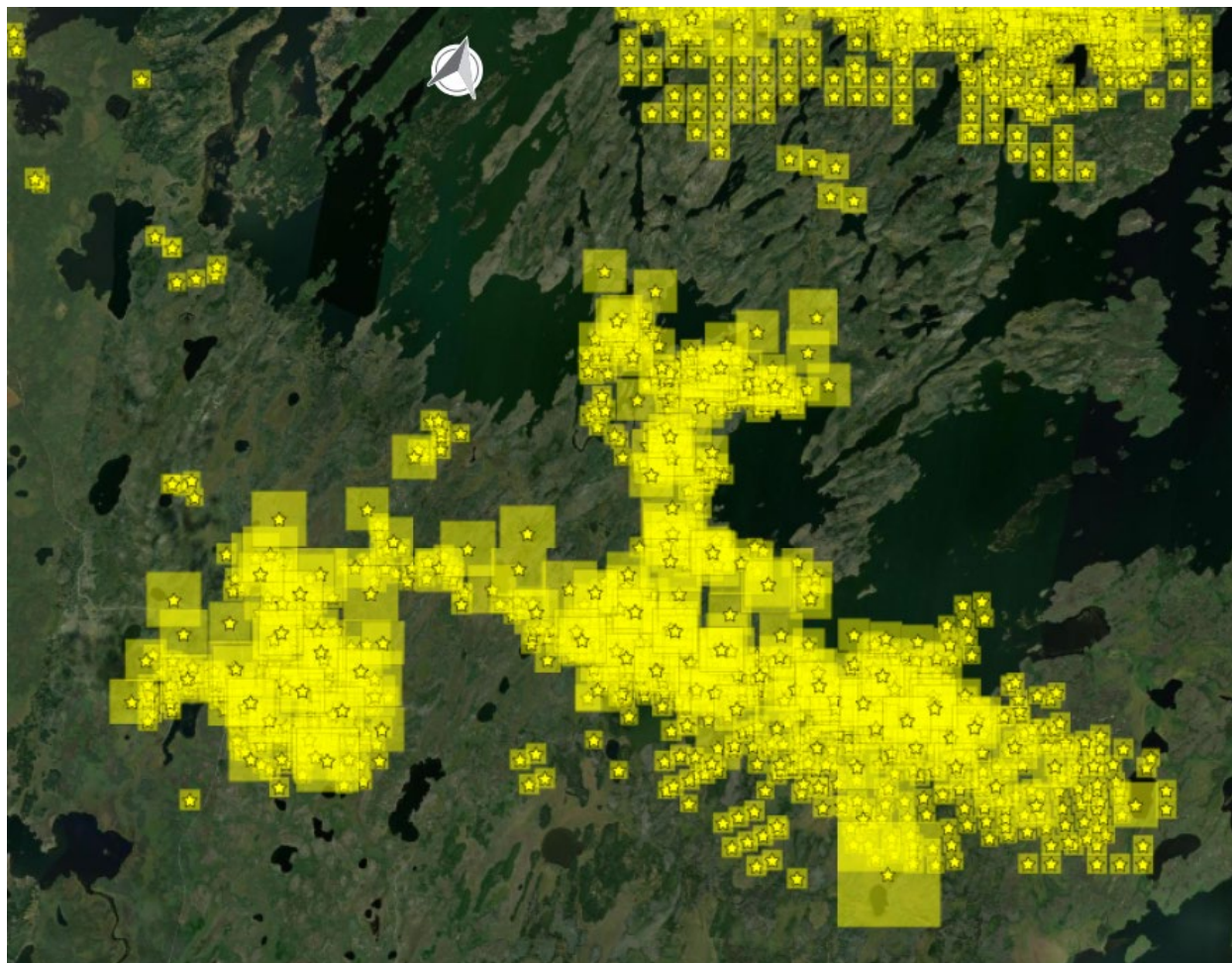


Figure 152. Satellite imagery of the wildland areas 175 km (108.7 mi) north of Red Lake, Ontario, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 3, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 6, 2025.

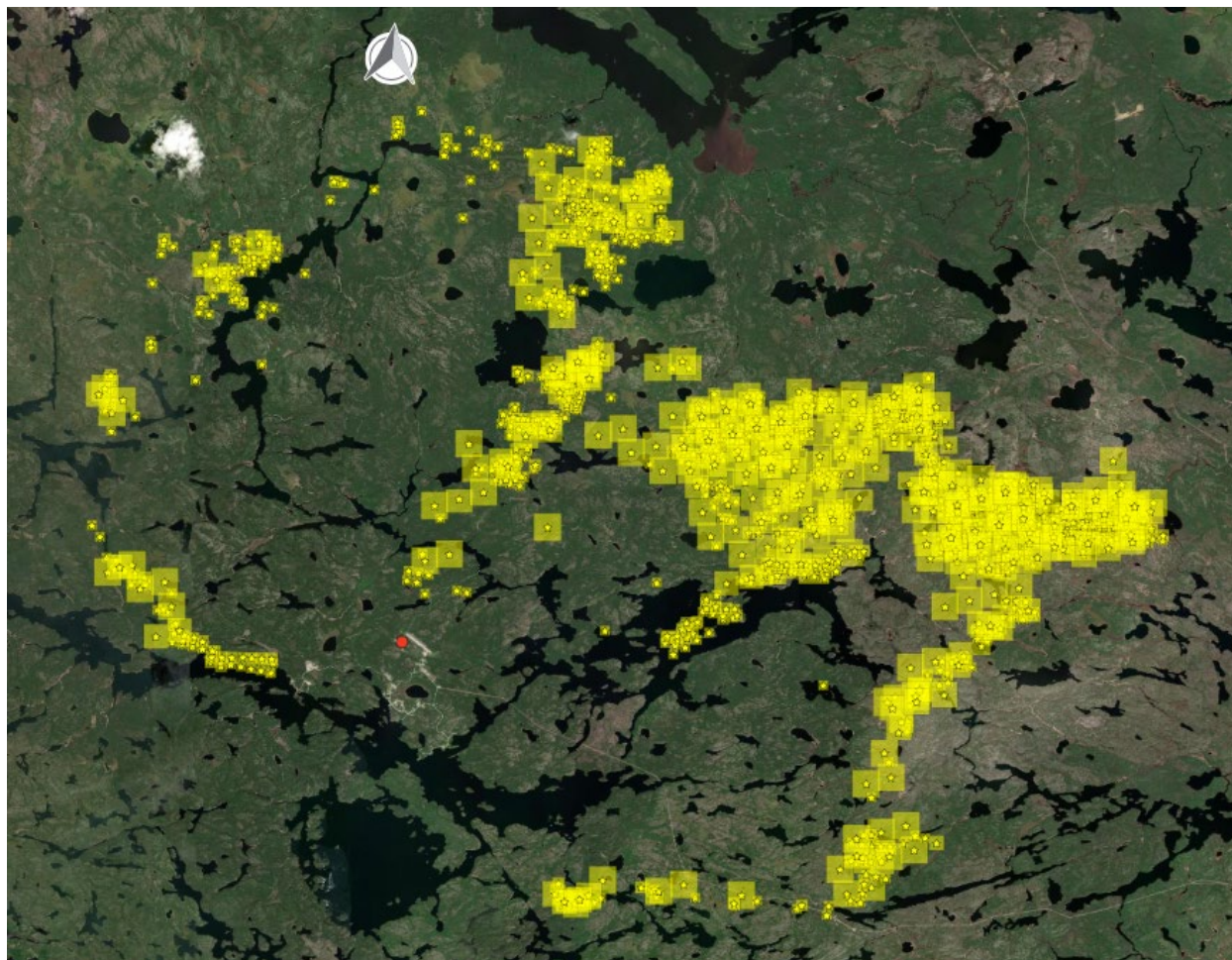


Figure 153. Satellite imagery of the wildland areas 145 km (90.1 mi) northeast of Winnipeg, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 2, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 7, 2025.

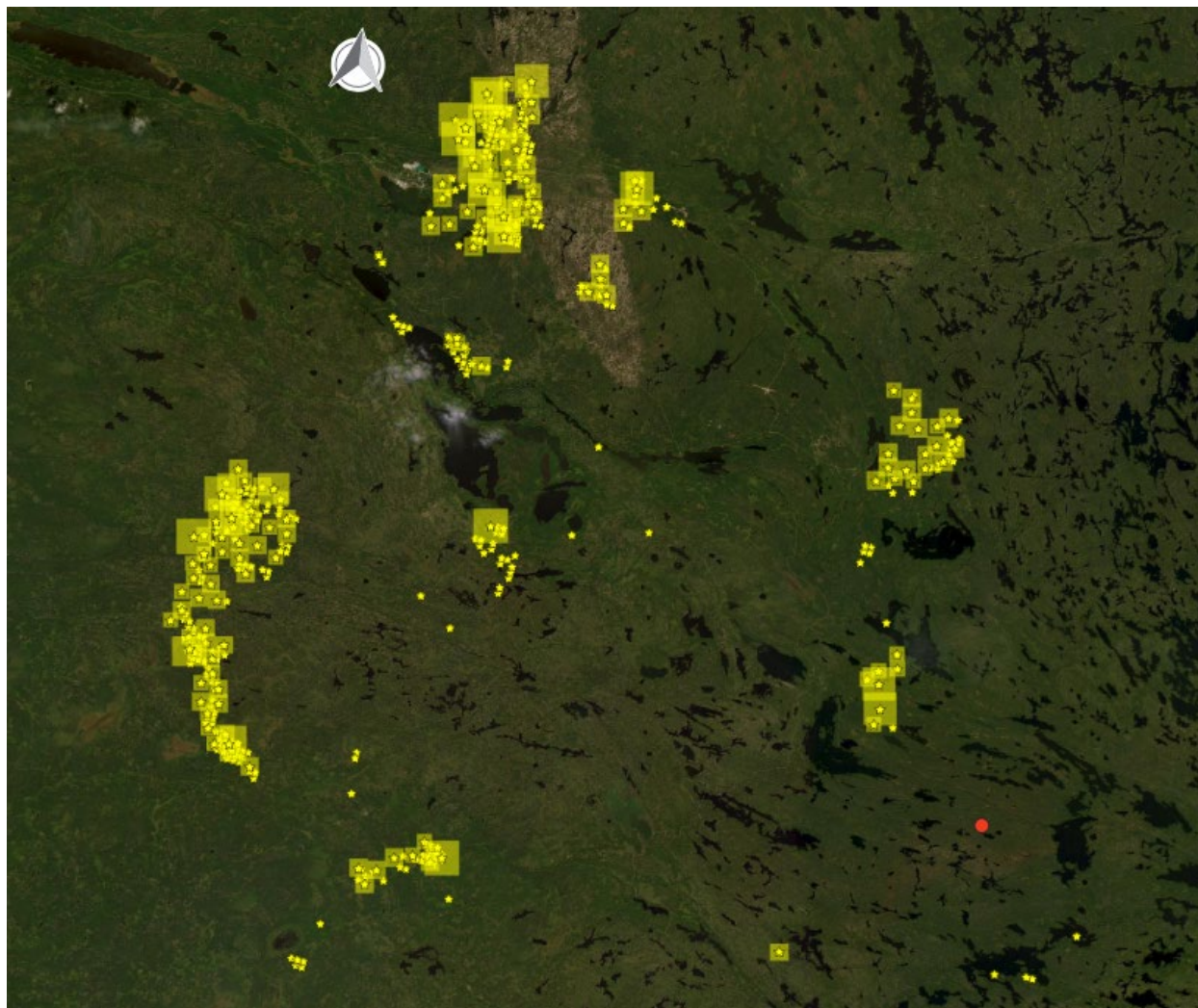


Figure 154. Satellite imagery of the wildland areas 12 km (7.5 mi) east-northeast of La Ronge, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 5, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on June 8, 2025.

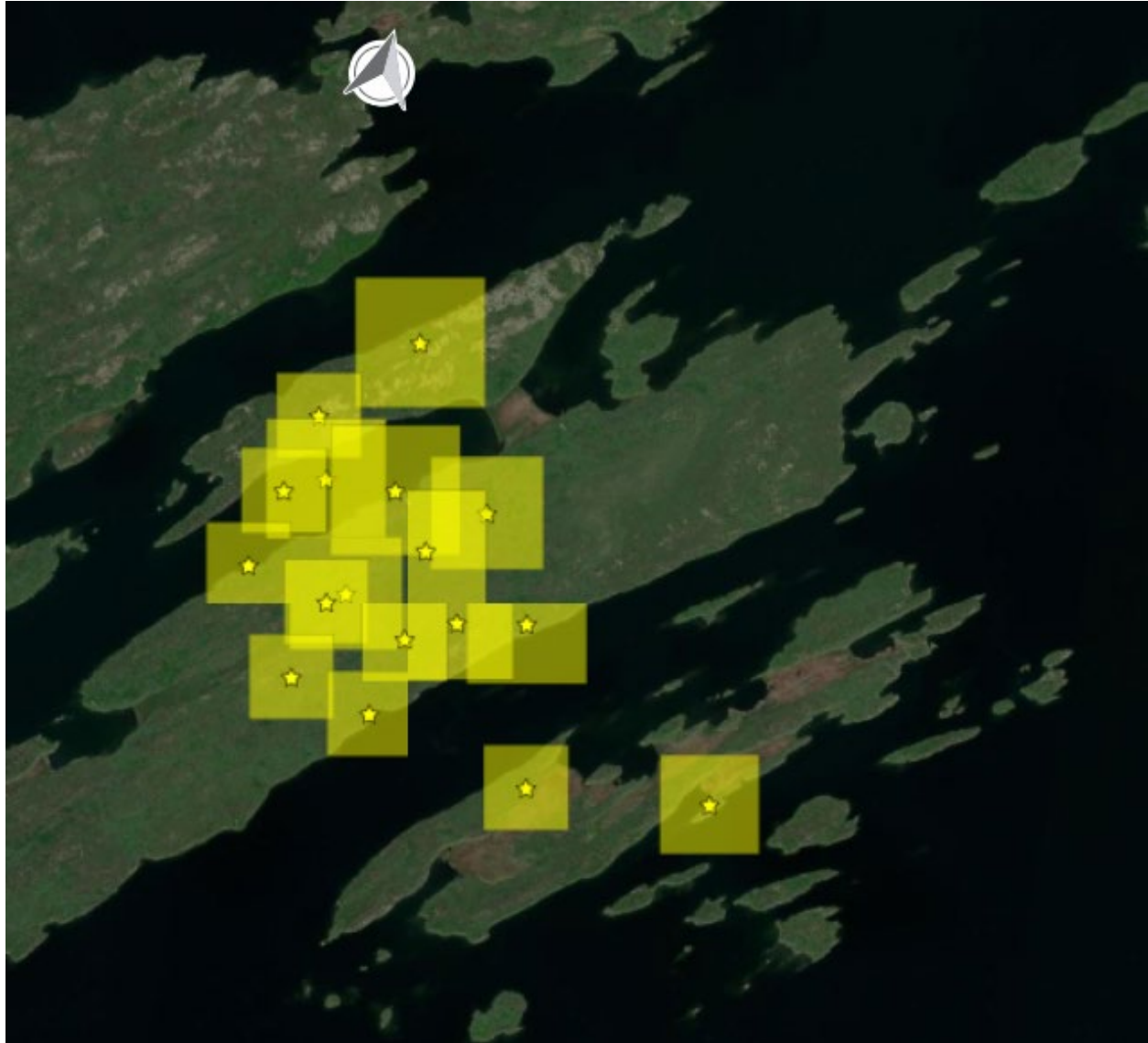


Figure 155. Satellite imagery of the wildland areas 18 km (11.2 mi) northwest of Pinehouse, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 10, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on July 14, 2025.

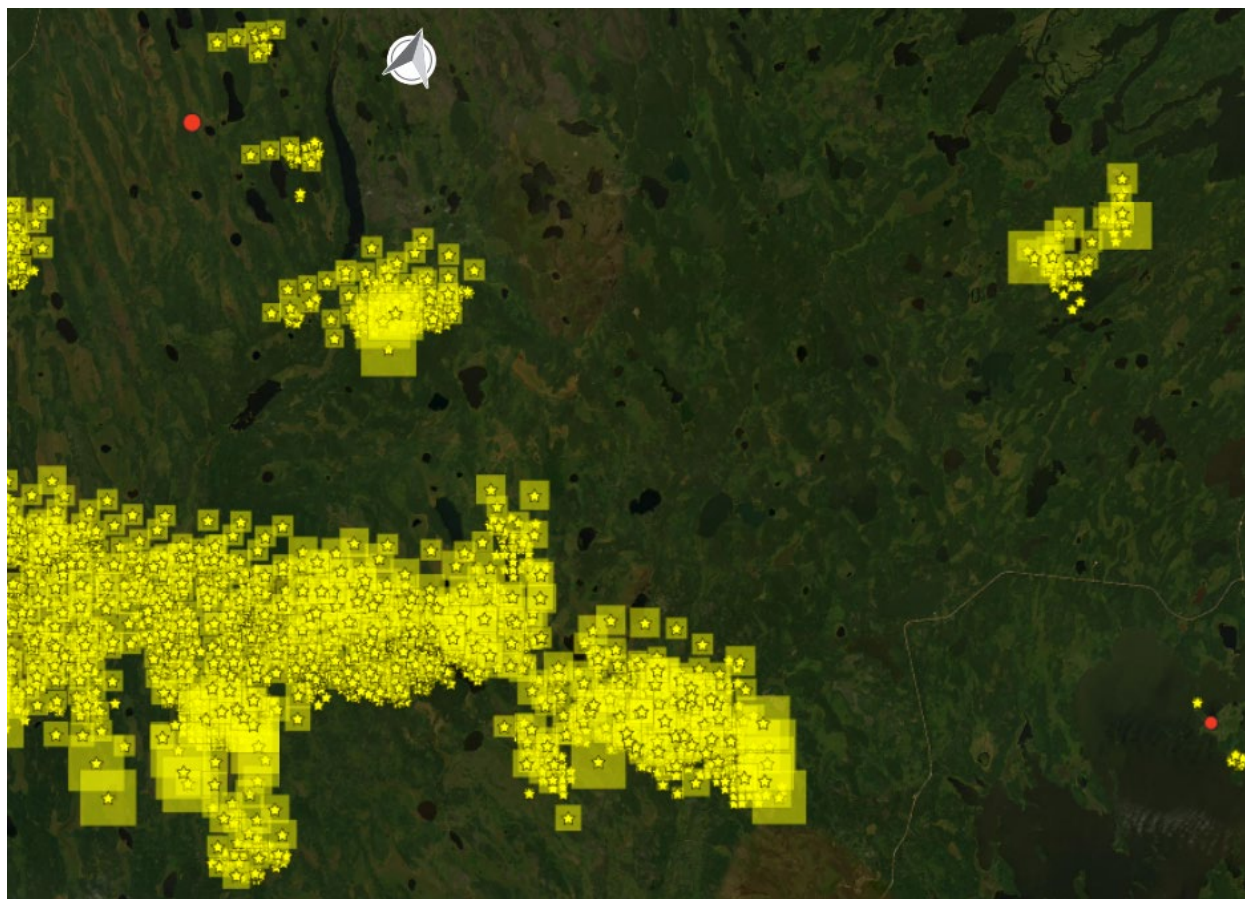


Figure 156. Satellite imagery of the wildland areas 45 km (28.0 mi) south-southwest of Buffalo Narrows, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 11, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on July 15, 2025.

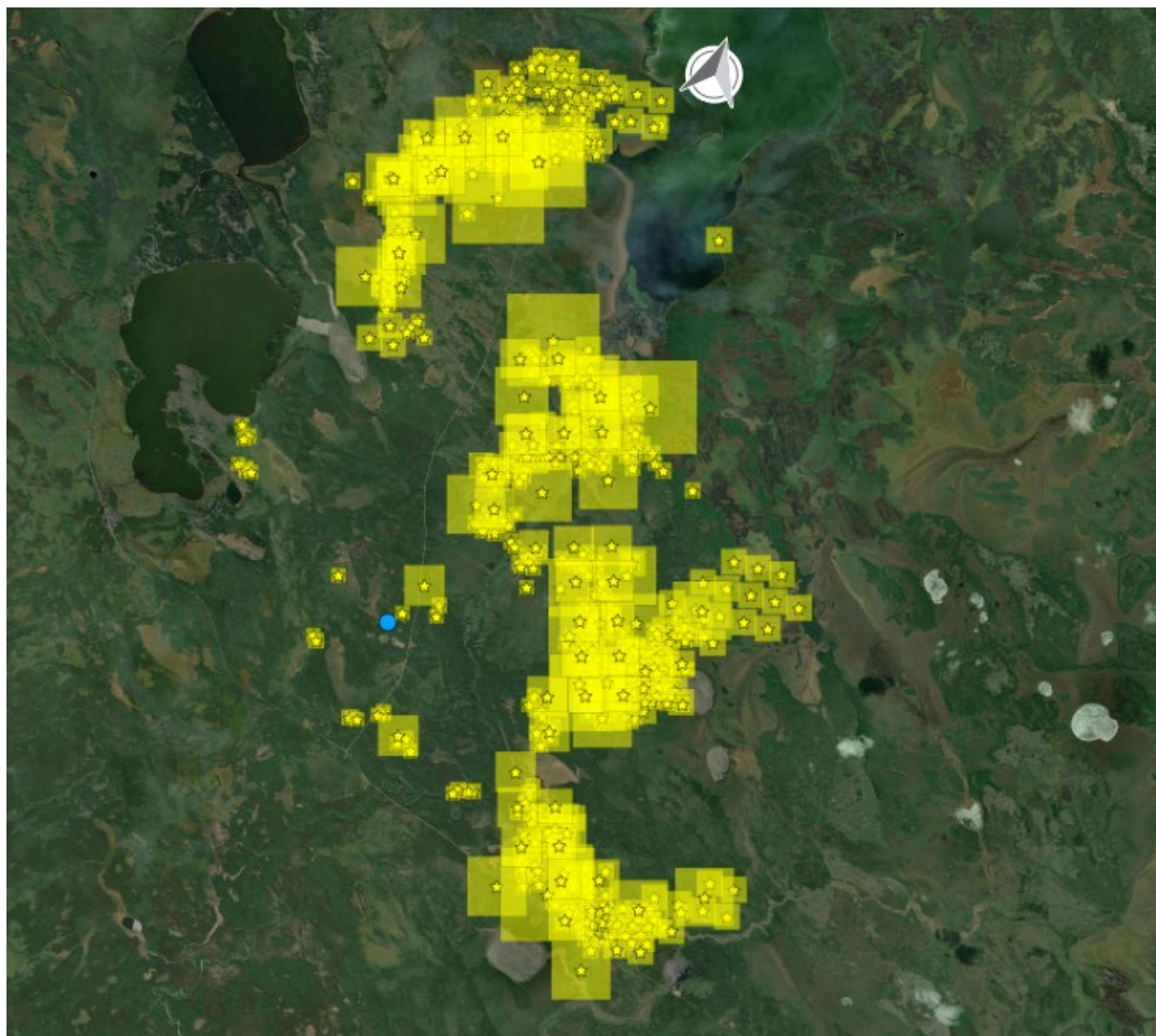


Figure 157. Satellite imagery of the wildland areas 45 km (28.0 mi) southwest of La Ronge, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 28, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on July 31, 2025.

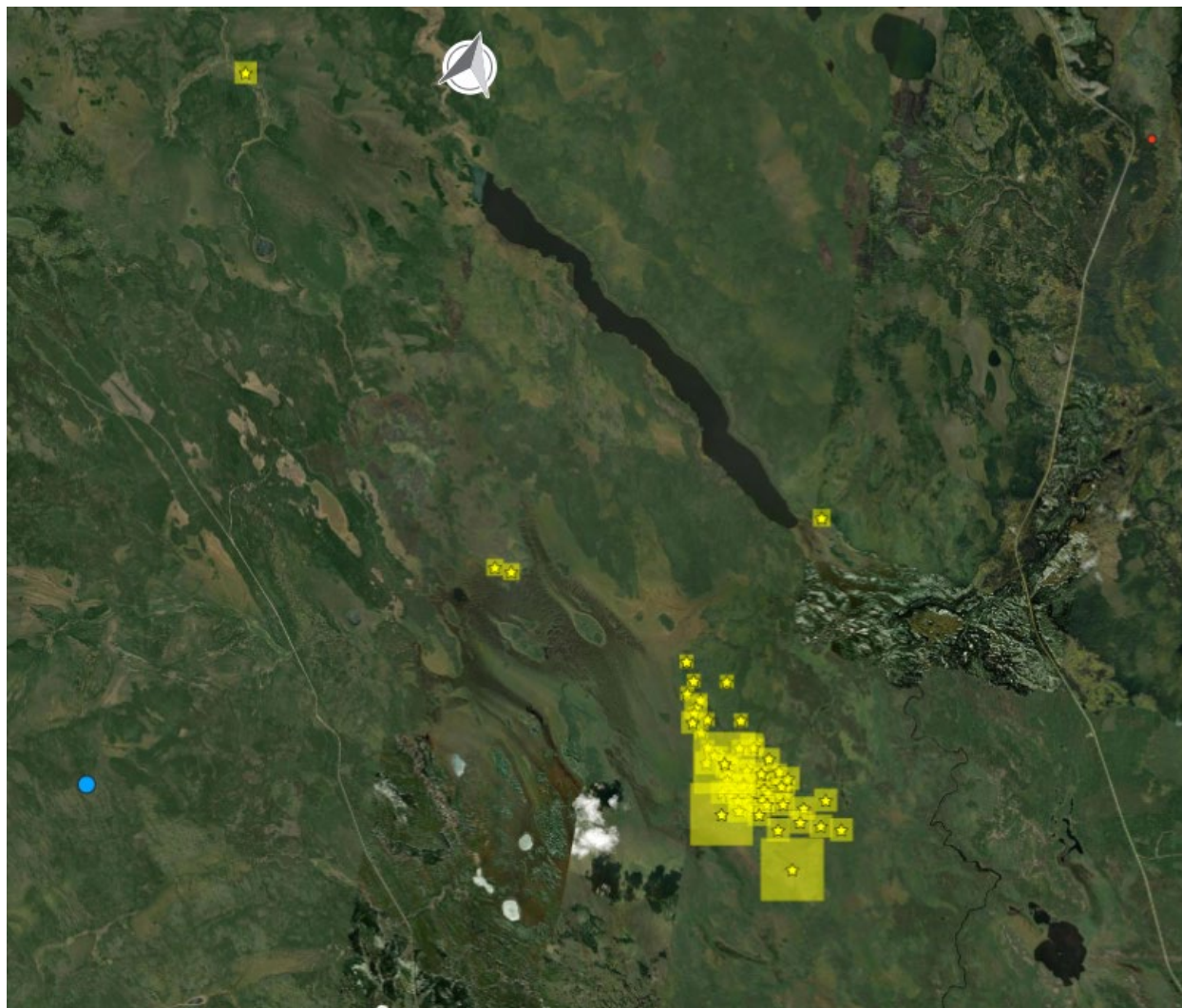


Figure 158. Satellite imagery of the wildland areas 36 km (22.4 mi) north of Garden Hill, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 29, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on August 1, 2025.

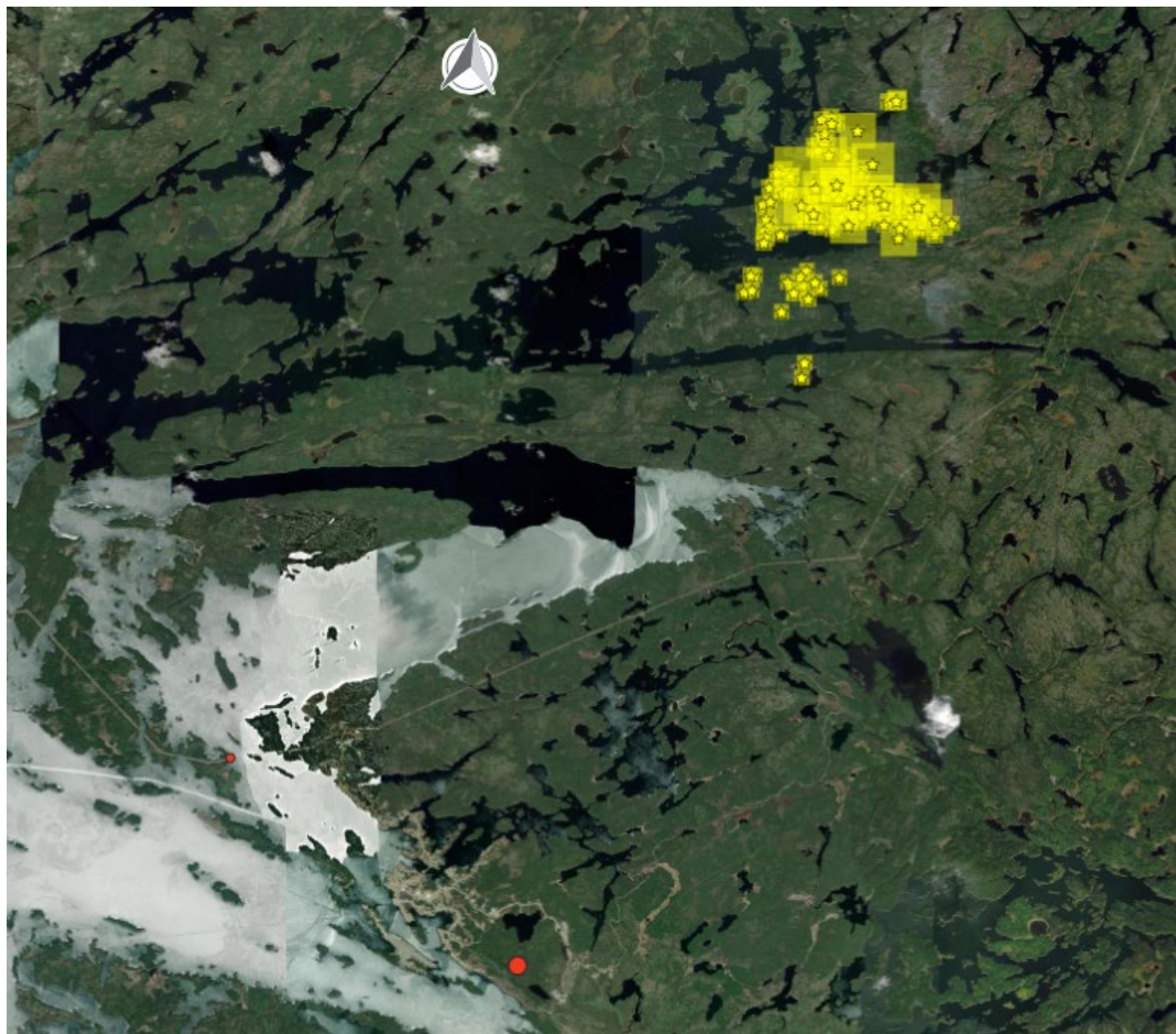


Figure 159. Satellite imagery of the wildland areas 105 km (65.2 mi) northeast of Bloodvein, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on August 1, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on August 4, 2025.

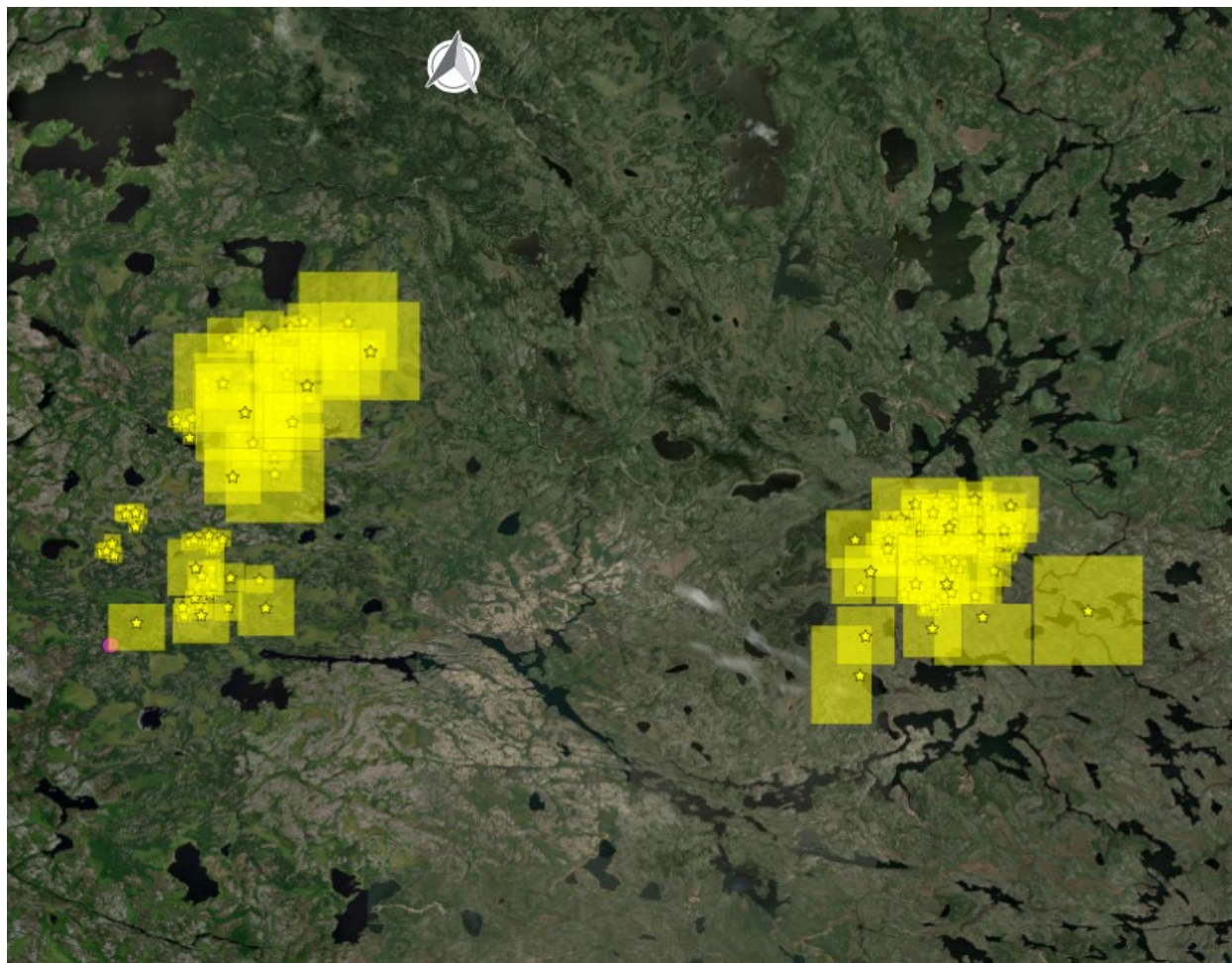
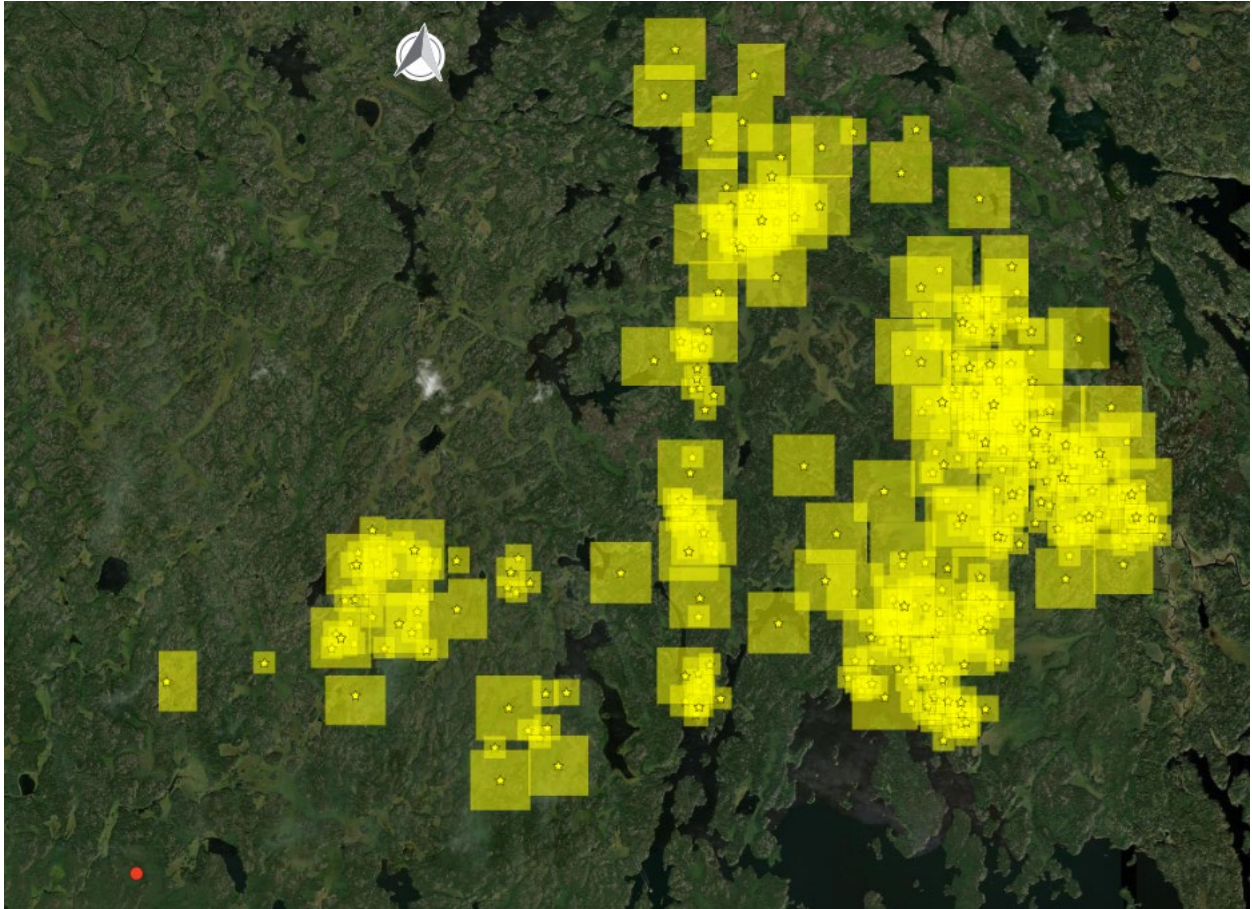


Figure 160. Satellite imagery of the wildland areas 75 km (46.6 mi) east of Bloodvein, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 31, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Lucas County on August 5, 2025.



Extensive wildfire activity occurred on wildlands across Canada during the late spring and summer of both 2023 and 2025. The Canadian government estimates that on average 67% of the area burned in Canada from wildfires is due to lightning-caused fires⁴³. CIFCC⁴⁴ reported that on June 1, 2023, “a major lightning strike hit Quebec, igniting 182 forest fires in a single day”. Some of these wildfires ultimately led to the smoke plumes that impacted Lucas County

⁴³ <https://natural-resources.canada.ca/our-natural-resources/forests/wildland-fires-insects-disturbances/forest-fires/fire-behaviour/13145>

⁴⁴ https://cifcc.ca/sites/default/files/2024-03/03.07.24_CIFCC_2023CanadaReport%20%281%29.pdf

on June 5 and June 17, 2023. On July 5, Alberta Wildfire informed CIFFC that increased fire behavior was to be expected over the next week or so, along with continued increased risks of fire hazard conditions⁴⁵. On June 1, 2025, Parks Canada⁴⁶ reported to CIFFC a higher concern due to fire danger conditions in and near Prince Albert National Park in Saskatchewan⁴⁷. On June 5, 2025, OMNRF-AFFES reported to CIFFC that battling holdover fires caused by recent lightning were the primary concern⁴⁸. On July 3, 2025, the Saskatchewan Public Safety Agency reported to CIFFC that lightning strikes starting new wildfires are a major concern in the western half of the province⁴⁹. This concern was relayed again to CIFFC on July 20, 2025⁵⁰. On August 3, 2025, OMNRF-AFFES, Alberta Wildfire, and the Saskatchewan Public Safety Agency all reported to CIFFC increased concern regarding lightning strikes starting new wildfires⁵¹.

As the June 2023 and June, July, and August 2025 fires on wildlands in Canada were reported to have been started by natural causes, namely unplanned ignitions caused by lightning strikes, they are considered wildfires as defined in 40 CFR 50.1(n). Since these wildfires occurred predominantly on wildlands, they meet the not reasonably controllable and not reasonably preventable criterion in the Exceptional Events Rule. The wildfires burning in June 2023 and June, July, and August 2025 could not have been prevented and could not have been controlled by state or federal natural resources managers in the United States. The excessive wildfire smoke emissions in 2023 and 2025 that contributed to monitored violations of the 2024 revised annual PM_{2.5} NAAQS at the Eastside Pump St monitoring site in Lucas County were caused by the wildfires and not the result of emissions from anthropogenic sources.

⁴⁵ <https://ciffc.net/situation/2023-07-05>

⁴⁶ <https://parks.canada.ca/nature/science/conservation/feu-fire/incendies-wildfires>

⁴⁷ <https://ciffc.net/situation/2025-06-01>

⁴⁸ <https://ciffc.net/situation/2025-06-05>

⁴⁹ <https://ciffc.net/situation/2025-07-03>

⁵⁰ <https://ciffc.net/situation/2025-07-20>

⁵¹ <https://ciffc.net/situation/2025-08-03>

5. Fireworks Display, Natural Event, or Human Activity Unlikely to Recur at a Particular Location

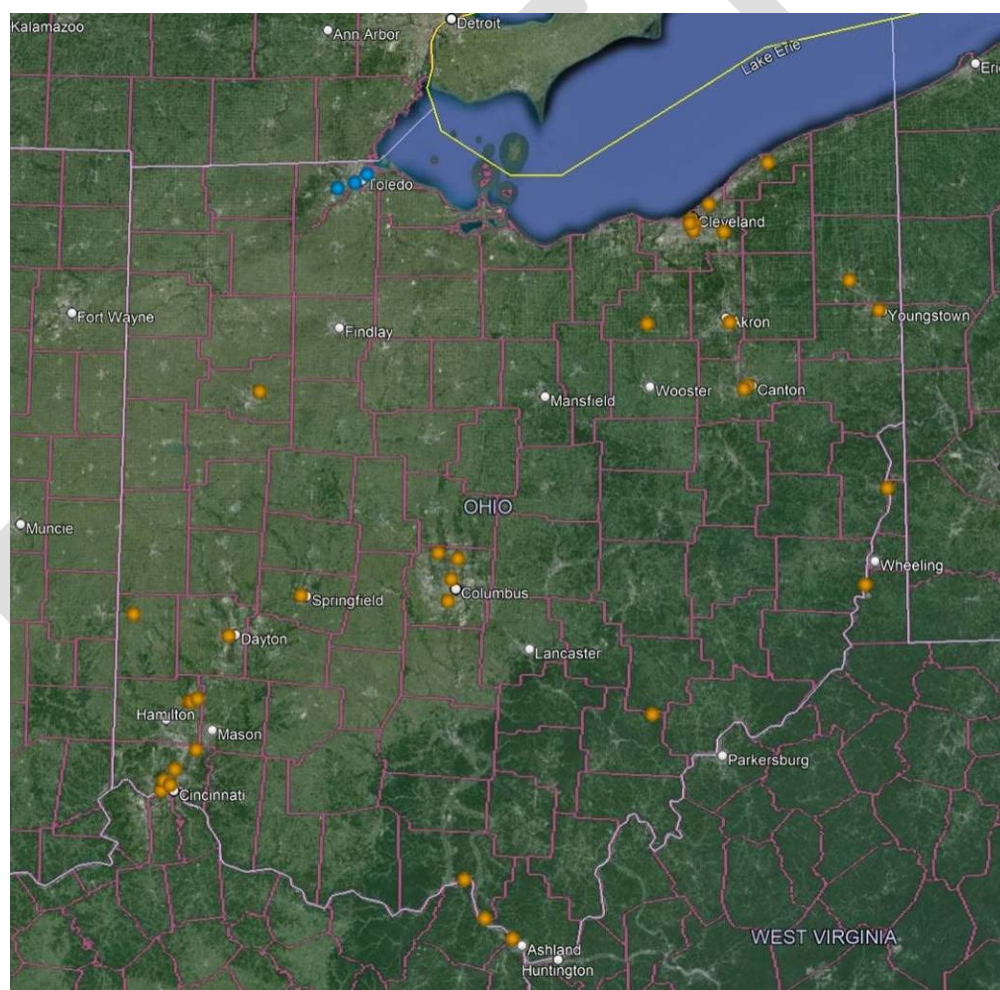
40 CFR 50.14(c)(3)(iv)(E) requires a demonstration that the event was a natural event or human activity that is unlikely to recur at a particular location, or that the event was a fireworks display consistent with 40 CFR 50.14(b)(2). 40 CFR 50.1(k) defines a natural event as “an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role”, and further states that for purposes of this definition, “anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions”. Additionally, 40 CFR 50.1(n) states that a “wildfire that predominantly occurs on wildland is a natural event”.

As described in this document, the origin and evolution of the June 2023 and June, July, and August 2025 wildfires occurred predominantly on wildlands across Canada. It has also been demonstrated that widespread Fourth of July holiday celebration-related fireworks displays generated smoke that impacted PM_{2.5} concentrations at the Eastside Pump St monitoring site in Lucas County on July 5, 2025. Based on the documentation provided in this demonstration, the relevant June 2023 and June, July, and August 2025 events qualify as wildfires because lightning most likely caused these unplanned wildfire events. As these wildfire events occurred on wildlands and were caused by lightning, they were natural and should be considered for treatment as exceptional events.

6. Public Notification

Ohio EPA maintains a public alert system as well as publicly available information via the Ohio EPA website⁵² to keep residents informed of potential wildfire smoke impacts. As required by 40 CFR Part 58, Appendix D, Ohio EPA and partner public health and air pollution control agencies in the state install, operate, and maintain a network of instruments to measure ambient air quality at monitoring sites across the state. Figures 161, 162, and 163 show the locations of active and recently active PM_{2.5} monitoring sites in the state of Ohio, in Lucas County, and in the city of Toledo, respectively.

Figure 161. Map of active and recently active PM_{2.5} monitoring sites in the state of Ohio.



⁵² <https://epa.ohio.gov>

Figure 162. Map of active PM_{2.5} monitoring sites in Lucas County.

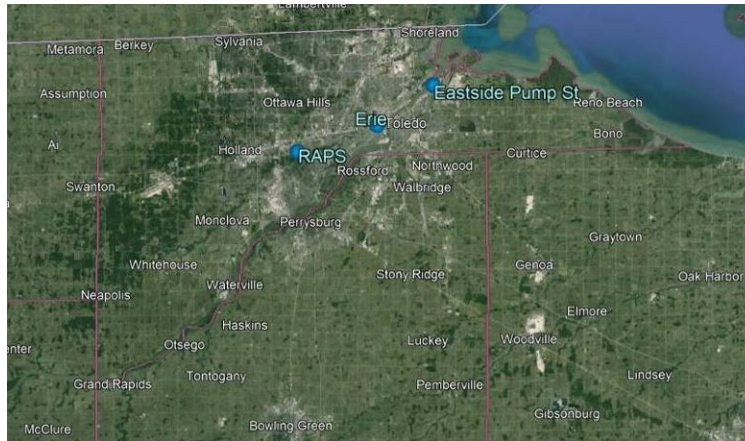
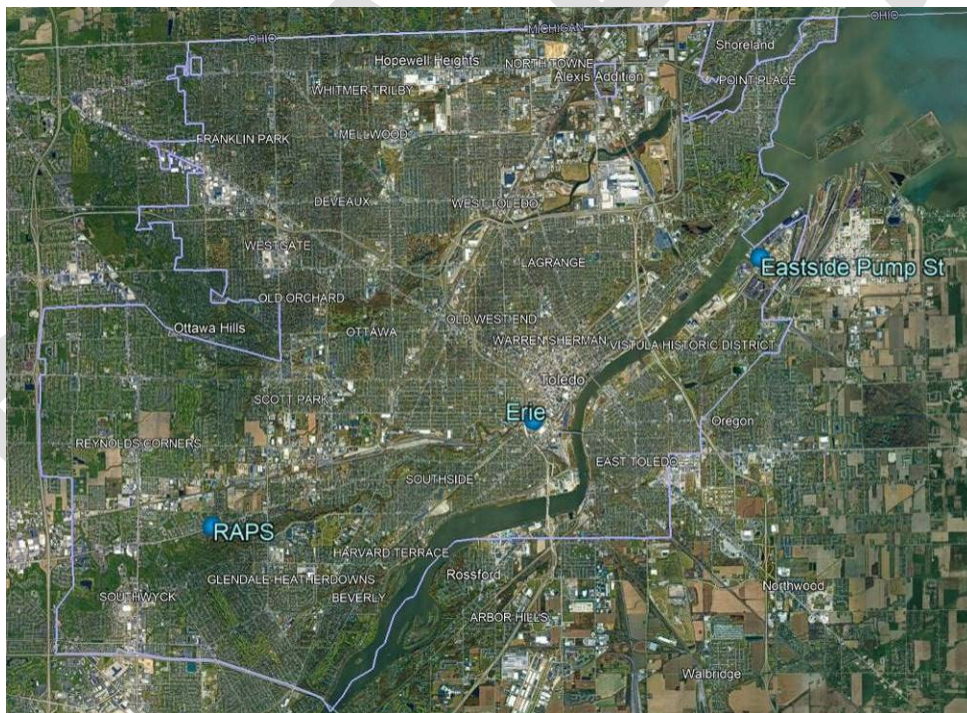


Figure 163. Map of active PM_{2.5} monitoring sites in the city of Toledo.



The Eastside Pump St monitoring site in Lucas County was operational and collected ambient PM_{2.5} measurements throughout 2023 and 2025, including during the seven PM_{2.5} episodes detailed in this demonstration. Ohio EPA reported these data in real time to U.S. EPA for

inclusion in the AirNow⁵³ system, which triggers EnviroFlash notifications upon the Air Quality Index reaching the “Unhealthy for Sensitive Groups” category for those registered to receive such notifications. The PM_{2.5} ambient concentration data from the Eastside Pump St monitoring site were also publicly accessible through the Ohio EPA Division of Air Pollution Control website⁵⁴.

⁵³ <https://www.airnow.gov/>

⁵⁴ <https://epa.ohio.gov/divisions-and-offices/air-pollution-control/reports-and-data/airohio-air-monitoring-data>

7. Public Participation

In accordance with the requirements of 40 CFR 50.14(c)(2)(i), on August 13, 2026, Ohio formally notified U.S. EPA of its intent to request the exclusion of data due to exceptional events. A copy of the initial notification form submitted to U.S. EPA regarding exceptional events in Lucas County is included as Appendix A. Ohio published solicitation for public comment concerning the draft Exceptional Events Demonstration for 2023 and 2025 PM_{2.5} Episodes in Lucas County, OH on September 17, 2026. The public comment period closed on October 19, 2026. Appendix B includes a copy of the public notice, a copy of the public comments received, and a copy of Ohio's responses to the public comments received.

8. Summary

This exceptional events demonstration shows that wildfires in Canada adversely affected ambient PM_{2.5} concentrations measured by the Eastside Pump St (39-095-1003) monitoring site in Lucas County, Ohio on June 5 and June 17 in 2023, as well as on June 3, June 4, June 5, June 6, June 7, June 8, July 14, July 15, July 31, August 1, August 4, and August 5 in 2025. Additionally, this exceptional events demonstration shows that smoke from Fourth of July holiday celebration-related fireworks displays adversely affected ambient PM_{2.5} concentrations measured by the Eastside Pump St monitoring site in Lucas County on July 5, 2025. The ambient PM_{2.5} concentrations measured at the Eastside Pump St (39-095-1003) monitoring site in Lucas County on these 15 dates have been shown to have contributed to a monitored violation of the 2024 annual PM_{2.5} NAAQS, and it has been demonstrated that the exclusion of the ambient PM_{2.5} concentrations measured at the Eastside Pump St monitoring site on these 15 dates would result in a 2023-2025 annual PM_{2.5} design value that is at or below the 2024 annual PM_{2.5} NAAQS value of 9.0 µg/m³, which will help preclude Lucas County from being designated a nonattainment area for the 2024 annual PM_{2.5} NAAQS, proving regulatory significance. Therefore, Ohio EPA requests that U.S. EPA exclude the PM_{2.5} data from the two identified dates in 2023 (June 5 and June 17) and the 13 identified dates in 2025 (June 3, June 4, June 5, June 6, June 7, June 8, July 5, July 14, July 15, July 31, August 1, August 4, and August 5) from the Eastside Pump St (39-095-1003) monitoring site in Lucas County, Ohio from regulatory determinations, including calculations of annual PM_{2.5} design values, due to the influence of exceptional events, namely Canadian wildfire smoke or smoke from Fourth of July holiday celebration-related fireworks displays, on the monitored PM_{2.5} concentrations during those 15 dates.

This exceptional events demonstration includes all the required elements of wildfire smoke-driven PM_{2.5} exceptional events demonstrations as described in the Exceptional Events Rule. These included elements meet all applicable requirements of the Exceptional Events Rule and clearly demonstrate that wildfire smoke from Canada and smoke from Fourth of July holiday celebration-related fireworks displays had significant adverse impacts on ambient PM_{2.5} concentrations measured at the Eastside Pump St (39-095-1003) monitoring site in Lucas County, Ohio on the 15 identified dates.